LOWER PASSAIC RIVER STUDY AREA

PABST BREWING COMPANY

PRP DATA EXTRACTION FORM AND SUPPORTING DOCUMENTS
FOR GENERAL NOTICE LETTER CANDIDATES

PREPARED ON BEHALF OF THE
LOWER PASSAIC RIVER STUDY AREA
COOPERATING PARTIES GROUP

SUBMITTED TO USEPA REGION II

December 7, 2009

106262

LOWER PASSAIC RIVER STUDY AREA
PRP DATA EXTRACTION FORM

PABST BREWING COMPANY

EXECUTIVE SUMMARY:

Pabst Brewing Company (“Pabst”) operated a brewery on Grove Street in Newark (the “Site”) from 1946 to 1985. The wastewater from the Site contained heavy metals, including cadmium, chromium, copper, lead, nickel, zinc and arsenic, as documented by sampling in the late 1970s. Pabst’s process wastewater was discharged into the Passaic Valley Sewerage Commissioners’ (“PVSC”) Combined Sewer Overflow (“CSO”) system and was subject to bypassing to the Passaic River over a number of years, including 29 years before the issuance of the PVSC’s National Pollution Discharge Elimination System (”NPDES”) permit. Pabst was identified as a “Major Contributing Industry” by the PVSC in 1977 and a “Significant Industrial User” of the PVSC system in 1982, discharging 1.44 million gallons of wastewater per day.

CURRENT MAILING ADDRESS/CONTACT INFORMATION:

Kevin Kotecki, CEO
Pabst Brewing Company
9014 Heritage Parkway
Ste. 308
Woodridge, IL 60517

See, Pabst Website, 2008, Attachment 1 (LPRSA0159787); Hoover’s Report – Pabst Brewing Company, 2009, Attachment 2 (LPRSA0159788).

FACILITY ADDRESS:

400 Grove Street
Newark, NJ

See, Heavy Metals Source Determination Study, 1980, Attachment 3 (FNC000001-2).

FINANCIAL VIABILITY (annual revenue and number of employees)**:**

Pabst was originally incorporated in Wisconsin between 1871 and 1874 as Philip Best Brewing Co. The company changed its name to Pabst Brewing Co. in 1889 and re-incorporated in 1920 as Pabst Corp. In 1932, Pabst Corp. was merged by Premier Malt Products Company and the following year the name was changed to Premier-Pabst Corporation. In December 1938 the name was changed again to Pabst Brewing Company. In 1985, Pabst Brewing Company was acquired by S&P Company, whose ownership was given over to the Kalmanovitz Charitable Trust in July 2000. While the company's financial data is not publicly released, the company's sales in 2003 were estimated to be $600 million.

See, Moody's – Pabst Brewing Company, 1915, Attachment 4 (LPRSA0159736); Moody's – Pabst Corp., 1927, Attachment 5 (LPRSA0159740); Moody's – Pabst Brewing Company, 1984, Attachment 6 (LPRSA0159773); Pabst Company History, 7-21-2004, Attachment 7 (LPRSA0159783); Hoover's Listing – Pabst Brewing Company, 2006, Attachment 8 (FNC000315).

DATES OF OPERATION (include information on predecessors/successors if known)**:**

E. Hoffman & Son Soda and Mineral Water Works ("Hoffman") operated at the Site starting in 1924. Pabst purchased the property from Hoffman on November 15, 1946, and Hoffman and Pabst shared joint tenancy and production facilities for a time. Operations ceased at the facility in 1985.

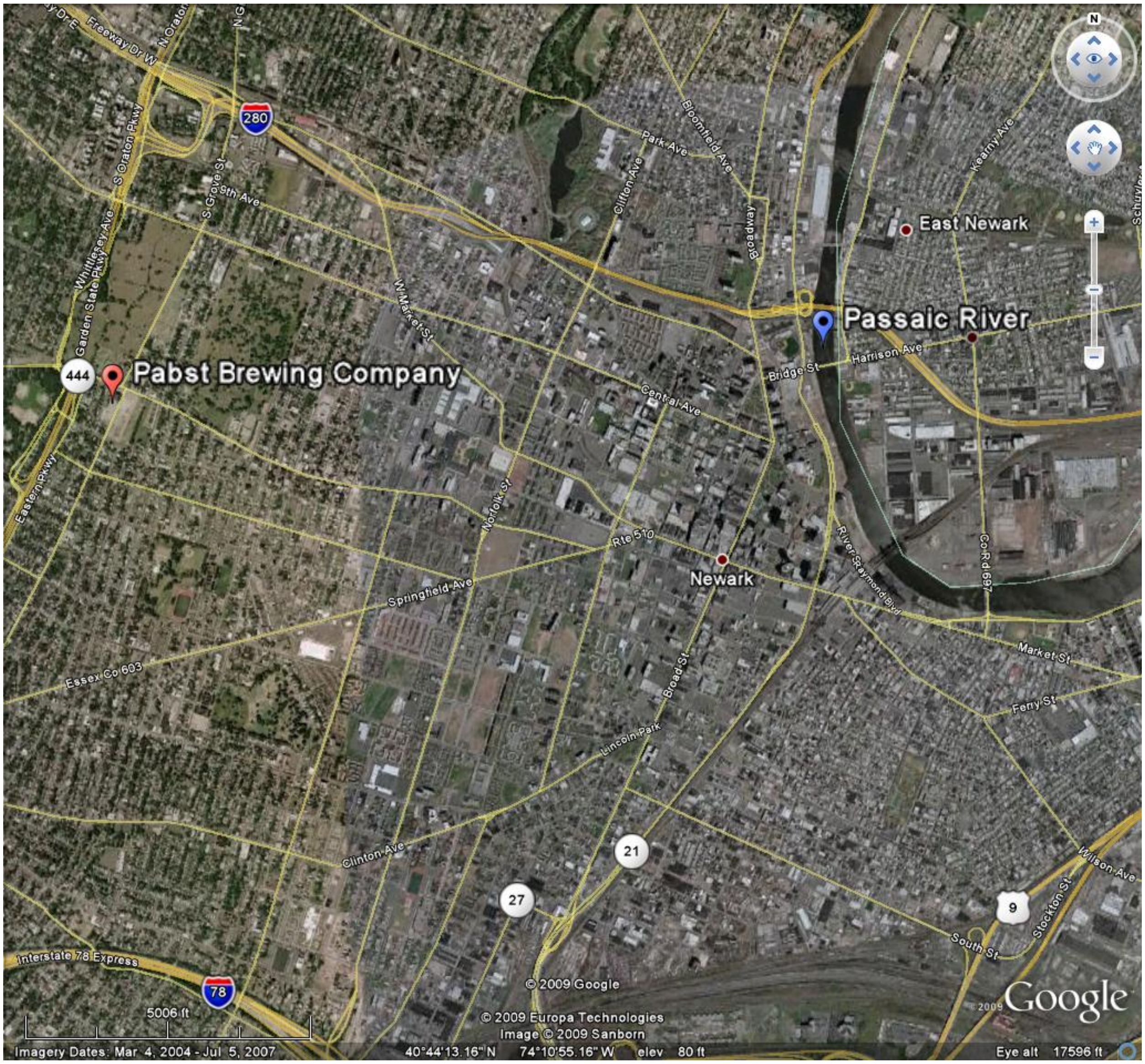
See, Discharge Investigation and Corrective Action Report, Attachment 9 (FNC000265); Pabst NJPDES Permit Files, Attachment 10 (LPRSA0042807).

DESCRIPTION OF FACILITY OPERATIONS (list CERCLA hazardous substances used, manufactured or present)**:**

Pabst Brewing Company brewed and packaged approximately 206,000 barrels of beer monthly at the Site. The principle raw materials used in the operations included barley malt, corn grits, hops, yeast and water. Caustic soda was used onsite to clean recycled beer bottles and spent caustic discharged into the sanitary sewer "without treatment or dilution." The PVSC identified Pabst as a "Major Industrial Contributor" in 1977 and the company is named as a Significant Industrial User ("SIU") on their 1982 permit for discharge into the PVSC system, generating 1.44 million gallons per day ("GPD") of wastewater without pretreatment. During the closing of the plant in June 1985, 1.3 million gallons of beer and 8,000 gallons of anhydrous ammonia were dumped into the sanitary sewer.

See, Pabst NJPDES Permit Files, Attachment 10 (LPRSA0042735-6, LPRSA0042840-1, LPRSA0042847); Pabst Letter, 7-18-1985, Attachment 11 (FNC000165); Industrial Wastewater Questionnaire, 7-10-1978, Attachment 12 (FNC000003); Waste Effluent Survey, 6-6-1972, Attachment 13 (FNC000023); Waste Effluent Survey, 4-14-1975, Attachment 14 (FNC000036); Sewer Connection Permit Application, 1-25-1980, Attachment 15 (FNC000077); PVSC Semi-Annual Report, 1977, Attachment 31 (ABC015402).

The annotated aerial photograph below illustrates the location of the Site relative to the Passaic River.



Source: GoogleEarth, 2009, annotated

Wastewater Generation

The Site's wastewater generation is primarily from the brewing process, utilities cooling and non-contact cooling in packaging. Each of these wastewater sources will be discussed in detail below.

See, NPDES Permit Application, 4-21-1975, Attachment 16 (FNC000054-69).

Brewing/Fermenting

Heavy metals are known to be present in the brewing process and brewery wastewater in general. A 2006 study of brewery waste sludge identified manganese, magnesium, zinc, copper, lead and nickel in sludge created by drying brewery effluent. These are some of the same heavy metals known to be present in Pabst's wastewater from the Site. As detailed below, Pabst was discharging upwards of one million gallons of brewery waste per day without pretreatment, meaning that all heavy metals usually found in wastewater treatment sludge would have been discharged into the sanitary sewer during Pabst's four decades of operation. Pabst's sanitary flow in 1985 was made up of water from the washdown of vessels, piping, equipment, sinks and cooling water from the air conditioners (discussed separately in the Utilities Cooling sub-section below).

See, Pabst NJPDES Permit Files, Attachment 10 (LPRSA0042820); Utilization Potential of Brewery Waste Water Sludge as an Organic Fertilizer, 2006, Attachment 17 (LPRSA0156715); The Composting of Brewery Sludge, 2002, Attachment 18 (LPRSA0156620).

Metals-specific industrial sampling done in 1978 for a study reported in 1980 indicated that Pabst had the following in their effluent:

- Cadmium at 0.009 mg/l, or .118 lbs per day
- Chromium at 0.164 mg/l, or 2.147 lbs per day
- Copper at 0.179 mg/l, or 2.344 lbs per day
- Lead at 0.117 mg/l, or 1.532 lbs per day
- Nickel at 0.011 mg/l, or .144 lbs per day
- Zinc at 0.801 mg/l, or 10.488 lbs per day
- Arsenic at .002 mg/l, or 0.026 lbs per day
- Mercury at .001 mg/l, or 0.0157 lbs per day

Pabst's NJPDES permit application and a waste effluent survey conducted in 1972 report the following additional heavy metals in the Site's effluent:

- Aluminum up to 10.96 mg/l
- Magnesium up to 8.58 mg/l

- Selenium up to .024 mg/l

See, Heavy Metals Source Determination Study, 1980, Attachment 3 (FNC000002); Pabst NJPDES Permit Files, Attachment 10 (LPRSA0042748); Sewer Connection Permit Application, 1-25-1980, Attachment 15 (FNC000082).

Utilities Cooling

The chromium found in the Site's discharge to the PVSC can likely be explained by the use of water for utilities cooling. Pabst was discharging this wastewater to the sanitary sewer, and at the time of the company's operations, it was common for anti-corrosion agents containing chromium or chromate to be added to cooling tower water to guard against the corrosion of the metal parts of the cooling system. In 1987, even after Pabst's operations had ceased at the Site, approximately 15% of comfort cooling towers (for air conditioning) in the country were still using chromium-based water treatment chemicals. This practice was eventually entirely banned in the early 1990s, due to environmental concerns, primarily associated with wastewater discharges.

See, NPDES Permit Application, 4-21-1975, Attachment 16 (FNC000068); Removal of Chromate from Cooling Tower Blowdown by Reaction with Electrochemically Generated Ferrous Hydroxide, 1973, Attachment 19 (LPRSA0159812); Chromium Emissions from Comfort Cooling Towers – Background Information for Proposed Standards, 1988, Attachment 20 (LPRSA0159798-801); Chromate Removal in Closed HVAC Recirculating Systems, undated, Attachment 23 (LPRSA0159791).

If chromates were used alone in the water, a concentration above 200 ppm was necessary to maintain corrosion protection; however, lower concentrations of chromates could be used if they were combined with other chemicals, commonly zinc or phosphate. EPA stated in 1987 that "a large amount of data has shown that the average concentration of chromate in industrial process cooling towers is 13 ppm" and that for "comfort cooling towers" (i.e., air conditioning), a reasonable assumption would be 10 ppm.

See, Chromium Emissions from Comfort Cooling Towers - Background Information for Proposed Standards, 1988, Attachment 20 (LPRSA0159805, LPRSA0159811).

In addition to the chromium-based anti-corrosion agents introduced into the cooling tower water, typical water treatment programs included an antiscalant, an antifoulant, a dispersant, a surfactant, a biocide and an acid and/or caustic soda for pH control. These additives are made up of "many combinations of various chemicals." Anti-scalants and anti-foulants were often made of calcium carbonate, calcium sulfate and calcium phosphate. If phosphonates were used instead of phosphate, it was often necessary to add benzotriazole (or another azole) to minimize the corroding effect of chlorine combined with phosphonates. Microbiocides were usually made from chlorine, bromine, iodine, methylene bisthiocyanate, or, rarely, from acrolein or heavy metals. See, Chromium Emissions from Comfort Cooling Towers - Background Information for Proposed Standards, 1988, Attachment 20 (LPRSA0159801-11).

A patent application from 1971 for a cooling tower water treatment system describes the customary practice of continuously running a chemical pump to inject the various anti-scalants, anti-corrosives into the system and periodically adding large quantities of algaecide as well. These systems included a water bleed system to allow the water "saturated with large quantities of minerals and chemicals" to be removed from the system and replaced with fresh water. See, US Patent - Cooling Tower Water Treatment System, 1971, Attachment 21 (LPRSA0159833).

As late as 2003, a patent application described air conditioning condensate as "laden with various chemical constituents and heavy metal concentration." See, US Patent – Air Conditioning Condensate Drainage System, 2003, Attachment 22 (LPRSA0159822).

Non-Contact Cooling Water

Starting in 1964 or 1965, Pabst began discharging non-contact cooling water into the Orange Avenue storm sewer to "avoid hydraulically overloading the sanitary sewer system." For a period of time from sometime after December 3, 1980 until at least July 1983, this effluent was re-directed into the sanitary sewer due to a problem with chemical oxygen demand ("COD"). The storm sewer in Orange Avenue leads eventually to Maybaum Creek and from there to the Rahway River.

See, Pabst NJPDES Permit Files, Attachment 10 (LPRSA0042714, LPRSA0042781, LPRSA0042802).

Site Remediation

In 1991, a Closure Plan for nine underground storage tanks ("USTs") at the Site was submitted by the subsequent property owner and approved by NJDEP. Tanks E1 through E4, located near the loading docks for Building 14, were used to store No. 6 heating oil for the boilers. Tank E5 was a No. 2 diesel fuel tank for use in Building 7; Tank E6 was a 20,000-gallon tank used to store No. 2 diesel fuel for use in trucks and/or a compressor/generator in Building 17. Tank E7 was, in fact, two interconnected 2000-gallon gasoline tanks for the motor pool in Building 17, and Tank E8 was a 1,000-gallon gasoline tank, also for the motor pool. E9 was a 4,000-gallon No. 2 diesel fuel tank close to tank E5. Five of these tanks were closed in-place and the other four were removed. Soil sampling was conducted in the excavations and around the tanks that were closed in-place; in addition, soil from the tank excavations was stockpiled and sampled in composite.

See, UST Closure Summary Report, 3-1992, Attachment 24 (FNC000224-9, FNC000232).

Site Soil Sampling and Contamination

Site soils have been analyzed and found to contain the following levels of the constituents listed below.

- VOCs up to 791,000 ppb
- Barium up to 802 ppb
- Lead up to 183 ppb
- Aroclor 1254 up to 2,560 ppb
- Total BTEX up to 791 ppm
- Non-Targeted VOC up to 3,185 ppm
- Total B/N up to 21.391 ppm
- Non-targeted B/N up to 22.520 ppm
- Lead up to 12 ppm
- Phenanthrene up to 3.3 ppm
- Anthracene up to 0.72 ppm
- Fluoranthene up to 4 ppm
- Pyrene up to 2.8 ppm
- Chrysene up to 1.8 ppm
- Benzo(a)anthracene up to 1.5 ppm
- Benzo(b)fluoranthene up to 2.8 ppm
- Benzo(a)Pyrene up to 1.6 ppm
- Ideno(1,2,3-C,D)Pyrene up to 0.92 ppm
- Benzo(GHI)perylene up to 0.86 ppm
- TPH up to 4,540 ppm
- Methylene chloride up to 0.049 ppm
- Toluene up to 683 ppb
- Ethylbenzene up to 717 ppb
- Xylenes up to 5,000 ppb

As discussed under Permits below, the Site's stormwater drainage is to the Rahway River.

See, Discharge Investigation and Corrective Action Report, 3-26-1992, Attachment 9 (FNC000282, FNC000285-6, FNC000292-3); UST Closure Summary Report, 3-1992, Attachment 24 (FNC000218, FNC000246, FNC000248, FNC000255-6).

Site Groundwater Sampling and Contamination

During the closure of the tanks in October and November 1991, two monitoring wells were installed around the former E7 and E8 locations only, as these were gasoline tanks and gasoline has a higher likelihood than fuel oil of reaching the water table. A third monitoring well was installed in December 1991,[1] downgradient of the former diesel tank (E5). Sampling performed on these wells in 1992 found the following levels of the constituents listed below.

- Total BTEX up to 38,800 ppb
- Total MTBE up to 100 ppb
- Total TBA up to 1,500 ppb
- TICs up to 15,200 ppb
- TPH up to 6,800 ppb
- Naphthalene up to 110 ppb
- Bis(2-ethylhexyl)phthalate up to 30 ppb

See, Discharge Investigation and Corrective Action Report, 3-26-1992, Attachment 9 (FNC000260, FNC000282-3, FNC000290, FNC000292, FCN000294);
UST Closure Summary Report, 3-1992, Attachment 24 (FNC000218, FNC000253);

PERMITS (provide dates)**:**

Pretreatment (POTW):

Pabst held Permit No. NJ0028088, permitting discharge of wastewater into the PVSC system, issued November 30, 1982 and expiring October 29, 1986.

See, Pabst NJPDES Permit Files, Attachment 10 (LPRSA0042734).

NJPDES:

Pabst was originally permitted on May 1, 1976 under Permit No. 0028088. Pabst held a subsequent NPDES permit, effective October 31, 1981 and expiring October 29, 1986. The permit indicated one discharge, designated 001, also known as the South Orange Avenue Storm Sewer, and authorizes discharge of non-contact cooling water to the Maybaum Creek – Rahway River via 001. This discharge began in August 1965.

The above-referenced permit was terminated as of June 1986 with respect to both POTW and surface water discharges.

---

[1] The same document that provides the 1991 date also states that MW-2 was installed in December 1992. Given that this well was sampled in March 1992, December 1991 is assumed to be the correct date.

See, Pabst NJPDES Permit Files, Attachment 10 (LPRSA0042718, LPRSA0042754, LPRSA042793-4, LPRSA0042802, LPRSA0042828, LPRSA0042835).

NEXUS TO LOWER PASSAIC RIVER STUDY AREA (describe in detail; cite to supporting documentation; date or time period of disposal; list CERCLA hazardous substances; and volume, if known)**:**

<u>Direct</u> (e.g. pipe, outfall, spill):

Information not available at this time.

<u>Sanitary Sewer</u> (provide name and location of sanitary sewer and receiving POTW):

1946-February 1975

All dischargers into "navigable waters" of the United States were required under the Federal Water Pollution Control Act Amendments of 1972 to apply for an NPDES permit from the USEPA. PVSC received its NPDES Permit effective February 28, 1975. See, PVSC NPDES Permit, Attachment 25 (KLL006250).

Although sanitary and storm sewers are separate in the immediate vicinity of the Site, area sewer maps specifically note the private 24" sewer line from Pabst and illustrate how it joins the PVSC's combined sewer line at Central Avenue. Documents provided by Pabst confirm that their sanitary sewage was discharged to a sewer that fed into the PVSC's line at Central Avenue. After Pabst's effluent joined the combined sewer, it was ultimately conveyed to the Clay Street Overflow and into the Passaic River during wet weather events. This is confirmed by the Heavy Metals Source Determination study commissioned by the PVSC in 1978 on the sources of heavy metals in the influent to the treatment plant. The study states explicitly that the heavy metals found in the effluent of the industry included in the study (which included Pabst) was "discharged directly to the Passaic River through the combined sewer outfalls."

See, Heavy Metals Source Determination Study, 1980, Attachment 3 (FNC000001-2); Newark Sewer Maps, Attachment 26 (LPRSA010920-3, LPRSA010953).

The Clay Street CSO overflow location is described by PVSC as being "on [the] westerly side of [the] intersection of Clay Street and McCarter Highway." Historical PVSC reports indicate that wastes were routinely bypassed from the PVSC main interceptor to the Passaic River at this location during wet weather events. See, Report Upon Overflow Analysis, 1976, Attachment 28, (KLL017161).

Seymour Lubetkin, Chief Engineer for the PVSC from 1950 to 1978, states in his 1994 affidavit that during his employment with the PVSC, it was common for the combined wastewater and stormwater normally handled by the system's trunk line to be diverted or bypassed directly to the river at times of high volume (i.e., after rainfall). He states that:

> *…the practice of bypassing was so necessary and frequent that I conclude that the wastestream of every entity connected to a municipal sewer system serviced by the PVSC was bypassed untreated to the Passaic River at some time or another.*

See, Affidavit of Seymour A. Lubetkin, 1-6-1994, Attachment 27 (KLL007269-KLL007270, KLL007275).

As discussed above, Pabst discharged to the PVSC system from the Site from 1946 until operations ceased in 1985. For 29 years, between 1946 and February 1975 (the effective date of the PVSC's NJPDES permit), those discharges were not covered by a federal permit. As Pabst's activities at the Site were substantially unchanged during the years of operation, their discharge during the pre-permit time period would have included the contaminants identified in the later sampling.

Based on the figures provided in the 1980 Study for pounds per day of heavy metals, and assuming the Site was operating 6.5 days a week year-round (based on Pabst's statements that they had six-to-seven operating days per week), the Site would have discharged the following to the PVSC during the 29-year unpermitted period, all of which would have been subject to bypass to the Passaic River during overflow periods.

- Cadmium – 1,157 lbs
- Copper – 22,975.9 lbs
- Lead – 15,016.7 lbs
- Nickel – 1,411.5 lbs
- Zinc – 102,803.4 lbs
- Arsenic – 254.9 lbs
- Mercury – 153.9 lbs

(Using the calculation lbs/day x 6.5 days/week x 52 weeks/year x 29 years).

See, Heavy Metals Source Determination Study, 1980, Attachment 3 (FNC000002).

Only chromium is not extrapolated in this manner, as its presence in Pabst's effluent is likely related to onsite cooling units that would not have been in use during the entire 29-year pre-permit time period. However, chromium was being discharged to the CSO system at a rate of 2.147 lbs/day, which would aggregate to more than 725 pounds of chromium over a single year.

February 1975 to 1985

In addition to pre-permit discharges to the PVSC system, Pabst had the following violations or exceedances of its permit:

- For the period February 1, 1983 to April 30, 1983, Pabst reported 11 dates on which its effluent exceeded the permitted pH level of 10.5 (February 1, February 7, February 14, February 22, March 7, March 28, April 4, April 5, April 18, April 19 and April 25, 1983). See Pabst NJPDES Permit Files, Attachment 10 (LPRSA0042697).

- For the period May 1, 1983 to June 10, 1983, Pabst reported four dates on which its effluent exceeded the permitted pH level of 10.5 (May 2, May 3, May 4, June 1). See, Pabst NJPDES Permit Files, Attachment 10 (LPRSA0042698).

- For the period November 1, 1983 to January 31, 1984, Pabst reported two dates on which their effluent exceeded the permitted pH level of 10.5 (December 6, 1983 and January 25, 1984). See, Pabst NJPDES Permit Files, Attachment 10 (LPRSA0042774).

- For the period May 1, 1984 to July 31, 1984, Pabst reported six dates on which their effluent exceeded the permitted pH level of 10.5 (May 22, June 4, June 6, July 17, July 18 and July 31, 1984). See, Pabst NJPDES Permit Files, Attachment 10 (LPRSA0042776).

- For the period August 1, 1984 to October 31, 1984, Pabst reported three dates on which their effluent exceeded the permitted pH level of 10.5 (August 1, August 7 and October 16, 1984). See, Pabst NJPDES Permit Files, Attachment 10 (LPRSA0042769).

- For the period November 1, 1984 to January 31, 1985, Pabst reported four dates on which their effluent exceeded the permitted pH level of 10.5 (November 27, December 7, December 27, 1984 and January 3, 1985); for this same period, Pabst reported that its wastewater contained petroleum hydrocarbons above permitted limits. See, Pabst NJPDES Permit Files, Attachment 10 (LPRSA0042772, LPRSA0042824).

- For the period February 1, 1985 to April 30, 1985, Pabst reported six dates on which their effluent exceeded the permitted pH level of 10.5 (February 6, February 8, February 11, February 15, April 3 and April 15, 1985). See, Pabst NJPDES Permit Files Attachment 10 (LPRSA0042773).

As stated above, non-contact cooling water was discharged from the Site into the Orange Avenue storm sewer to “avoid hydraulically overloading the sanitary sewer system," beginning in 1964 or 1965. For a period of time from sometime after December 3, 1980 until at least July 1983, this effluent was re-directed into the sanitary sewer due to a problem with chemical oxygen demand ("COD"). During this time period, Pabst reported permit violations/exceedances relative to the pH limits on their permit as detailed above.

Storm Sewer (provide name and location of storm sewer and receiving waters):

Information not available at this time.

Runoff:

Information not available at this time.

Groundwater:

Information not available at this time.

POTENTIAL NEXUS TO LOWER PASSAIC RIVER STUDY AREA (describe in detail; cite to supporting documentation; date or time period of disposal; list CERCLA hazardous substances; and volume, if known)**:**

Direct (e.g. pipe, outfall, spill):

Newark city directories from 1909 to 1918 list Pabst Milwaukee Beer Depot as a brewer and bottler located at 7-15 E. Fairmount Avenue. A 1908-1909 Sanborn Fire Insurance map shows a John B. Brasser beer bottling operation at this address. If this facility was, in fact, operated by Pabst at one point for brewing and bottling operations, it is almost certain that their wastewater discharge would have contained similar hazardous substances as that discharged from the Site. Since this location was in operation prior to the operational date of the PVSC system, any wastewater discharged would have been sent directly into the Passaic River via the city's sewers.

See, Newark Sewer Maps, Attachment 26 (LPRSA0010927); Newark Sanborn Map, 1908-1909, Attachment 29 (LPRSA0001736); Newark City Directories, Attachment 30 (LPRSA0157755, LPRSA0157757, LPRSA0158032, LPRSA0158035, LPRSA0158037, LPRSA0158061, LPRSA0158788-9, LPRSA0158955-7, LPRSA0159130).

Sanitary Sewer (provide name and location of sanitary sewer and receiving POTW):

Information not available at this time.

Storm Sewer (provide name and location of storm sewer and receiving waters):

Information not available at this time.

Runoff:

Information not available at this time.

Groundwater:

As discussed above, soils from the former UST closure excavation, which were stockpiled onsite and sampled in composite, contained Aroclor 1254. The source of PCBs in soil could have been an electrical substation present onsite. Currently-available documentation does not indicate that groundwater was sampled for PCBs; however, the presence of PCBs in the excavated soil could mean that they are also present in groundwater. Groundwater flow from the Site is towards the Passaic River.

See, UST Closure Summary Report, 3-1992, Attachment 24 (FNC000227, FNC000230).

LOWER PASSAIC RIVER STUDY AREA

TABLE OF CONTENTS

NEXUS PACKAGE FOR PABST BREWING COMPANY

December 7, 2009

Attachment 13	Waste Effluent Survey, 6-6-1972
Attachment 14	Waste Effluent Survey, 4-14-1975
Attachment 15	Sewer Connection Permit Application, 1-25-1980
Attachment 16	NPDES Permit Application, 4-21-1975
Attachment 17	Utilization Potential of Brewery Waste Water Supply Sludge as an Organic Fertilizer, 2006
Attachment 18	The Composting of Brewery Sludge, 2002
Attachment 19	Removal of Chromate from Cooling Tower Blowdown by Reaction with Electrochemically Generated Ferrous Hydroxide, 1973
Attachment 20	Chromium Emissions from Comfort Cooling Towers – Background Information for Proposed Standards, 1988
Attachment 21	US Patent – Cooling Tower Water Treatment System, 1971
Attachment 22	US Patent – Air Conditioning Condensate Drainage System, 2003
Attachment 23	Chromate Removal in Closed HVAC Recirculating Systems, undated
Attachment 24	UST Closure Summary Report, 3-1992
Attachment 25	PVSC NPDES Permit, 2-28-1975

Attachment 26	Newark Sewer Maps
Attachment 27	Affidavit of Seymour A. Lubetkin, 1-6-1994
Attachment 28	Report Upon Overflow Analysis, 1976
Attachment 29	Newark Sanborn Map, 1908-1909
Attachment 30	Newark City Directories
Attachment 31	PVSC Semi-Annual Report, 1977

ATTACHMENT 1

PRESIDENT'S MESSAGE

Welcome to the Pabst Brewing Company's corporate website.

As you may know, the Pabst Brewing Company has been around since 1844, although some of our beers have been proudly brewed since 1775. That was before this great country declared independence. Since we have been doing it for so long, you can be sure we know how to brew great beer.

We would like to share the rich history and heritage of our brands and maybe teach you a thing or two about our beer. Besides the historic perspective, this site also has a very practical application: Finding Beer!!!

On a frequent basis, we receive emails from consumers across the country asking about a particular brand's distribution. It's not uncommon for me to be asked something along the lines of, "I live in Kansas. Where can I find National Bohemian?" To help you find the availability of each of our brands, we have added a new feature to the "Our Beers" section. When you click on a particular brand, you will see a map of the United States below the product description. Simply click on a state and a list of the distributors in that area will appear in a pop-up box.

We hope you find the Pabst Brewing Company website both entertaining and informative. Make sure you stop by the history page and salute Captain Pabst. Let us know if anything is missing or how we can improve this site.

Kevin Kotecki
Chief Executive Officer

ATTACHMENT 2

Pabst Brewing Company

Woodridge, IL, United States

Company Description

Hoover's coverage by Barbara Murray

The Pabst Brewing Company is a 19th-century brewer retooled for the 21st century. Pabst, founded in Milwaukee in 1844, today is something of a...

Headquarters:
9014 Heritage Pkwy., Ste. 308
Woodridge, IL 60517
United States (Map)

Key Pabst Financials

Company Type	Private - Main Headquarters
Fiscal Year-End	July#
2003 Employees	700

Latest Pabst Jobs

jobs by Indeed

- Craft Manager
- Driver - Service Representative, Trainee
- Off Premise Sales Manager - Chicago Metro
- On Premise Manager

Competition

Competitive Landscape for Breweries

The major driver of demand is consumer leisure activity. The profitability of individual companies depends on marketing, distribution, and operational efficiency. Large companies have advantages in...

Top Pabst Competitors

- Anheuser-Busch
- Molson Coors
- SABMiller

Pabst Executives

Title	Name & Bio	Contact
Chairman	Bernard Orsi	Network | E-mail
President and CEO	Kevin T. Kotecki	Network | E-mail
COO	James P. (Jim) Walter	Network | E-mail

Navigate The Site

- Companies
- People
- Industries
- Expert Advice
- Products & Services
- IPO Central
- Build A Company List
- Build A List Of Executives
- Hoover's Books
- Help
- Feedback
- Site Map

Learn About Hoover's

- About Hoover's
- Affiliate Program
- Advertise With Us
- Careers
- Contact A Sales Representative

Hoover's Networl

- Hoover's Busines
- Bizmology
- Small Business R
- Industry Intellige

ATTACHMENT 3

HEAVY METALS SOURCE DETERMINATION STUDY

In 1976, the Passaic Valley Sewerage Commission ("PVSC") requested Elson T. Killam Associates to perform a study of the sources of heavy metals in the influent to the PVSC's treatment plant. This Heavy Metals Source Determination Study ("Heavy Metals Study") was completed in 1978.

As part of the Heavy Metals Study, the contributors of metals to the PVSC's system were surveyed regarding their general operations and use of the PVSC system. In addition, samples were taken of the effluent of these contributors to determine the type and amount of metals contributed by that industry to the PVSC system. The samples were analyzed for cadmium, chromium, copper, lead, nickel, zinc, arsenic, and mercury. The study calculated the daily loads of these metals in the effluent of each identified contributor, and presented the results in tabular form.

As explained in the REPORT ON INDUSTRIAL WASTE STREAMS BYPASSED TO THE PASSAIC RIVER submitted to EPA in August 1994, since 1924, untreated effluent from industrial contributors to the PVSC system has routinely been discharged or bypassed to the Passaic River through more than thirty-five combined sewer outfalls located within the Passaic River Study Area. As such, the heavy metals identified in the contributor's effluent as part of the Heavy Metals Study discharged directly to the Passaic River through the combined sewer outfalls. The attached table copied from the Heavy Metals Study reports the concentrations of heavy metals found in a specific industry's effluent discharged to the Passaic River.

Occidental Chemical Corporation ("OCC") offered to provide EPA a complete copy of the Heavy Metals Study when it was discussed with EPA's Investigator in Kroll's offices on July 21, 1994. If EPA would now like a complete copy of the Heavy Metals Study, OCC would be pleased to provide it.

PASSAIC VALLEY SEWERAGE COMMISSION - HEAVY METAL SOURCE DETERMINATION
PHASE II INDUSTRIAL CONTRIBUTION
SUB-AREA O

CONTROL NO.	NAME AND ADDRESS OF INDUSTRY	FLOW MGD	TOTAL CADMIUM LBS/DAY (MG/L)	TOTAL CHROMIUM LBS/DAY (MG/L)	TOTAL COPPER LBS/DAY (MG/L)	TOTAL LEAD LBS/DAY (MG/L)	TOTAL NICKEL LBS/DAY (MG/L)	TOTAL ZINC LBS/DAY (MG/L)	TOTAL ARSENIC LBS/DAY (MG/L)	TOTAL MERCURY LBS/DAY (MG/L)
1390	NEWARK BOXBOARD CO. 17 BLANCHARD ST. NEWARK	0.3560	0.053 (0.018)	0.926 (0.312)	0.938 (0.316)	2.797 (0.942)	0.036 (0.012)	4.216 (1.420)	0.021 (0.007)	0.0048 (0.002)
1400	NEWARK MORNING LEDGER CO. STAR LEDGER PLAZA NEWARK	0.0180	0.028 (0.187)	0.016 (0.109)	0.020 (0.133)	0.009 (0.061)	0.005 (0.031)	0.020 (0.134)	0.000 (0.001)	0.0004 (0.003)
1405	NEWARK TANK WASH INC. 335 RAYMOND BLVD NEWARK	0.0040	0.181 (5.420)	0.042 (1.270)	0.022 (0.667)	0.092 (2.770)	0.002 (0.056)	0.043 (1.300)	0.000 (0.010)	0.0009 (0.026)
1407	NEWARK WIRE CLOTH CO. 351 VERONA AVE. NEWARK	0.0030	0.013 (0.500)	0.007 (0.268)	0.144 (5.760)	0.029 (1.170)	0.003 (0.100)	0.211 < (8.440)	0.000 (0.001)	0.0002 (0.006)
1410	N.J. GALVINIZING & TINNING WORKS INC 139 HAYNES AVE. NEWARK	0.0700	0.005 (0.008)	0.052 (0.089)	0.064 (0.109)	0.794 (1.360)	0.022 (0.038)	2.913 (4.990)	0.001 (0.002)	0.0007 (0.001)
1420	OCEAN LEATHER CORP. 42 GARDEN ST. NEWARK	0.0270	0.002 (0.011)	4.999 (22.200)	0.024 (0.106)	0.095 (0.424)	0.014 (0.063)	0.046 (0.204)	0.001 (0.003)	0.0009 (0.004)
1440	ONDECKER METAL FINISHING INC. 178-182 EMMET ST. NEWARK	0.0040 <	0.000 (0.005)	0.001 (0.015)	0.008 (0.229)	0.001 (0.022)	0.025 (0.754)	0.000 (0.008)	0.000 (0.005)	0.0000 (0.000)
1460	PABST BREWING CO. 400 GROVE ST. NEWARK	1.5700	0.118 (0.009)	2.147 (0.164)	2.344 (0.179)	1.532 (0.117)	0.144 (0.011)	10.488 (0.801)	0.026 (0.002)	0.0157 (0.001)
1480	C. PATTI ELECTROPLATING CORP. 302 SOUTH 12TH ST. NEWARK	0.0030	0.006 (0.239)	0.044 (1.740)	0.007 (0.298)	0.001 (0.031)	0.013 (0.534)	0.215 < (8.610)	0.000 (0.001)	0.0001 (0.005)
1500	PHILLIPS MANUFACTURING CO. 190 EMMET ST. NEWARK	0.0001 <	0.000 (0.005)	0.000 (0.159)	0.223 (267.000)	0.001 (1.250)	0.000 (0.029)	0.054 (65.000)	0.000 (0.001)	0.0000 (0.000)

ATTACHMENT 4

MOODY'S ANALYSES OF INVESTMENTS

PART II
PUBLIC UTILITIES AND INDUSTRIALS

Containing in Detailed Form a Comparative Analysis of Public Utility and Industrial Companies in the United States and Canada, with Investment Ratings, Enabling the Banker and Investor to Ascertain the True Values of Securities

BY JOHN MOODY

SIXTH YEAR

1915

NEW YORK
MOODY'S INVESTORS SERVICE
35 NASSAU STREET
London: FREDC. C. MATHIESON & SONS, 16 Copthall Ave., E. C.

PABST BREWING COMPANY

History: Incorporated March 13, 1871, in Wisconsin, as the Philip Best Brewing Co.; name changed to present title March 16, 1889. Duration of corporation is perpetual The plant, located at Milwaukee, Wis., was established in 1844. Owns 428 properties located in 187 cities, most of which are used for the distribution of its product; remaining are utilized for other mercantile and commercial purposes. Also owns 209 ice houses located in 209 cities of the United States, which are used by local dealers as storage and distributing depots.

Management: OFFICERS: Gustave Pabst, Pres.; C. W. Henning, Vice-Pres.; H. J. Stark, Sec.; Wm. F. Schad, Asst. Sec. DIRECTORS: Gustave Pabst, Fred Pabst, W. O. Goodrich, C. W. Henning, H. J. Stark, Milwaukee, Wis. ANNUAL MEETING: Last Monday in January. GENERAL OFFICE: Milwaukee, Wis.

Comparative Income Account, Years Ended Dec. 31

	1914	1913	1912
*Net profit	$564,946	$900,605	$567,068
Other income	89,174	96,858	89,924
Total income	$651,120	$997,463	$656,992
Bond interest, etc.	93,126	108,415	102,861
Federal income tax	5,805	8,150	5,136
Preferred dividends	140,000	140,000	140,000
Common dividends	389,958	439,380	585,840
Balance	$25,231	$301,518	(def.)$176,815

* After providing for depreciation, expenses and all losses.

Comparative Condensed Balance Sheet, Years Ended Dec. 31

	1914	1913	1912	July 31, 1911
ASSETS:				
Real estate, plant machinery, etc.	$11,472,356	$11,414,198	$11,411,055	$11,367,601
Cash in hand of sinking fund trustees	....	1,248	2,308	2,373
Miscellaneous investments	694,288	1,339,181	1,173,014	1,121,522
Inventories	1,308,089	1,323,122	1,580,552	1,257,055
Bills and accounts receivable (less reserves)	2,139,216	1,752,351	1,776,751	2,566,763
Cash	150,865	207,904	161,490	537,988
Sundries	10,911	63,511	84,003	....
Invest. in and adv. to Bohannon Dredging Co.	253,872	210,387	....	....
Total	$16,059,597	$16,311,903	$16,188,703	$16,853,302
LIABILITIES:				
Preferred stock	$1,965,000	$2,000,000	$2,000,000	$2,000,000
Common stock	9,761,000	9,761,000	9,761,000	9,761,000
Bonded debt	1,037,000	2,058,000	2,197,000	2,327,000
Other liabilities	503,922	714,976	701,181	537,086
Insurance and other reserves	100,000	272,560	270,674	736,738
Common dividend, Jan., 1915	97,610	....	....	....
Surplus	1,691,435	1,407,367	1,165,848	1,487,878
Mortgage payable	....	35,000	....	....
Total	$16,059,597	$16,311,903	$16,188,703	$16,853,302

Table A.—Bond Records and Ratings (Based on Three Year Income Results, Etc.)

NAME OF ISSUE	Interest Payable	Maturity	Authorized	Outstanding	Average Income Available	Interest Required Per Annum	Factor of Safety	Basis for Rating		Net Rating
								Security	Salability	
1. Pabst Brewing Co. 1st gold 4s....	J&D 1	See text	$3,000,000	$2,197,000	$769,523	$87,880	89%	High	Good	Aa.

Note: Average income available is the average net income available for interest charges, after deducting taxes, depreciation, etc., for the three years ending Dec. 31, 1914. Interest requirement is the current requirement. The ratings are based not only on the statistical exhibits and averages, but other considerations are given due weight, such as the general financial condition of the property, character of its business, relative position of the issue, etc. For full explanation, see Introduction. For key to ratings, see pages 12 to 20.

REFERENCE NOTE ON BOND ISSUE:

1. Dated June 1, 1909; due $150,000 annually (June 1) to June 1, 1929; interest paid at Wisconsin Trust Co., Milwaukee. Coupon, $1,000. Direct first lien on all the property. Callable at 105 and interest. Retired bonds can be replaced by new bonds only with consent of holders of two-thirds in amount of preferred stock and the holders of two-thirds in amount of common stock. So long as the preferred stock is outstanding, the company cannot have outstanding bonds secured by this mortgage or bonds or other obligations secured by other lien in excess of $2,600,000. Interest paid without deduction for normal income tax.

Capital Stock: (1) Authorized, $2,000,000; outstanding, $1,965,000 7% cumulative preferred; par $100. Has preference for assets as well as to dividends, and is callable at any time at 115 and accrued dividends. It has equal voting power with the common. No additional stock can be authorized without unanimous consent of all the stockholders of the company. Transfer Agent: Bankers' Trust Co., New York. Registrar: Central Trust Co., New York. Listed on New York Stock Exchange. Dividends are paid quarterly, March 15.

(2) Authorized, $10,000,000; outstanding, $9,761,000 common; par $100.

ATTACHMENT 5

MOODY'S

INDUSTRIALS

JOHN MOODY

1927

OR KEY TO RATINGS SEE PAGES VII TO XI

9

23 24

LPRSA0159739

COMPARATIVE BALANCE SHEET, AS OF JAN. 31

ASSETS:	1927	1926	*1925
§Rl. est. (net equity)	....	....	$67,119
§Leaseholds	$141,196	$90,861	101,321
§Equip. & furniture	331,366	96,682	121,283
§Good-will	190,000	200,000	210,000
Investments	25,739	16,823	1,150
Cash	*71,290*	*164,250*	*599,669*
Demand loans (sec.)	....	*400,000*	....
Notes & accts. rec.	*541,437*	*539,823*	*474,039*
Due from stkhldrs..	*11,638*	*5,321*	*5,606*
Inventories	*1,091,623*	*783,196*	*562,752*
Marketable sec.	*179,195*	....	....
Mutual ins. deposits	6,801	....	....
Deferred charges ..	139,774	30,575	18,950
Total	$2,730,059	$2,327,531	$2,161,889
LIABILITIES:			
Preferred stock ...	†$986,650	$1,000,000	$1,000,000
Common stock	‡799,250	795,500	795,500
Notes payable	*375,000*	*45,000*	*75,000*
Accounts payable .. }	*262,211*	{ *88,714*	*82,934*
Accruals .... }		{ *13,064*	*24,688*
Customers' credits..	*57,934*	*58,372*	*53,534*
Due stkholders, etc..	*4,206*	*19,335*	*12,388*
Reserve for taxes..	*14,000*	*37,000*	....
Other current liab..	....	....	*1,419*
Cust. credit res.....	21,621	14,594	7,167
Surplus	209,187	255,952	109,259
Total	$2,730,059	$2,327,531	$2,161,889

* Giving effect to new financing. † Represented by 98,500 no par shares. ‡ Represented by 80,300 no par shares. § After amortization or depreciation.

WORKING CAPITAL.. *$1,188,633* *$1,631,105* *$1,392,103*

CAPITAL STOCK: 1. Ovington Bros. Co. cum. participating preference: Authorized, 100,000 shares; outstanding, 98,500 shares; in treasury, 1,500 shares; no par (changed from $100 par in Dec., 1925).

Has preference as to assets and dividends of 80 cents per share, cumulative from Jan. 1, 1926. Participates up to 20% of net profits for each fiscal year, beginning 1927, during which net profits exceed $225,000, payable July 1 next following fiscal year ending Jan. 31. In liquidation entitled to $15 per share and dividends, regular and participating. Callable on any dividend date on 60 days' notice at $15 per share on and after Jan. 1, 1931. Has no voting power except on default of dividends, etc., as specified. Issued to finance opening of Chicago store. Initial dividend of 40 cents per share paid July 1, 1926. Regular dividends paid J&J 2, to stock of record about D&J 15. Rating, *Caa*

Offered (50,000 shares) at $12.25 per share in Dec., 1925 by Throckmorton & Co., New York.

2. Ovington Bros. Co. common: Authorized, 100,000 shares; outstanding, 76,050 shares; in escrow under option of $5 per share, 4,250 shares; no par (changed from $100 par in Dec., 1925). Has exclusive voting power with restrictions. Dividends of 10% per annum paid on $100 par shares to 1923, incl.; 1924 and 1925, 6%. Initial dividend of 30 cents paid on no par stock July 1, 1926; Jan. 1, 1927, 30 cents. Dividends payable J&J 1. Rating, *Ca*

Transfer Agent: Equitable Trust Co., New York. Registrar: Seaboard National Bank, New York. Preferred listed on New York Curb Market. PRICE RANGE: Preferred: 1926, 11–9⅜.

PABST CORP.: Incorporated under Wisconsin laws in 1920. Manufactures and sells food and beverage products; also rents about 44% of its property. Owns real estate and buildings in Milwaukee, located at Cold Spring Ave. and Chestnut St. and 10th and 11th Sts.; Winnebago and Chestnut and 9th and 10th Sts.; Prairie and Chestnut and 9th and 10th Sts.; a parcel of land on Chestnut and 10th and 11th Sts. Total ground area, 470,000 sq. ft.; total floor space, 1,350,000 sq. ft. Controls Fred Pabst Co. and Pabst Sales Corp.

MANAGEMENT: OFFICERS: Fred Pabst, Pres.; Fred Pabst, Jr., Vice-Pres.; Edward Loebl, Sec.; J. H. Moore, Treas. DIRECTORS: Fred Pabst, Fred Pabst, Jr., Rudolph Pabst, F. J. Postel, J. H. Moore, E. Loebl, W. R. Patterson. ANNUAL MEETING: First Tuesday in Feb. OFFICE: Milwaukee, Wis.

CONSOLIDATED INCOME ACCOUNT, YEARS ENDED DEC. 31

	1926	1925
Gross profit	$1,541,043	Not stated
Selling and admin. expenses.	1,236,218	....
Oper. income	$304,825	$158,829
Margin of profit	*19.78%*	....
Other income	41,568	164,187
Total income	$346,393	$323,016
Fixed charges	$36,564	$30,217
Other charges	47,626	45,600
Federal and state taxes	54,875	19,350
Net income	$207,328	$227,849

CONSOLIDATED BALANCE SHEET, as of Dec. 31, 1926: Common stock, $2,875,700; bonded debt, $1,500,000; accounts and wages payable, $407,245; accruals, $110,748; deferred liabilities, $139,994; appropriated surplus, $453,194; earned surplus, $207,328; total, $5,694,209. Contra: Plant and equipment, $2,202,469; cash, $494,170; accounts receivable, $379,225; bills receivable, $72,395; inventories, $2,284,302; cash value life insurance, $3,774; treasury securities, $64,531; deferred assets, $193,343; total, $5,694,209.

BONDED DEBT: 1. Pabst Corp. first gold 5¼s: Authorized, $1,500,000; outstanding, $1,500,000. Dated March 1, 1927; due $150,000 each Mar. 1, 1930 to 1939 incl.

Interest paid M&S 1 at First Wisconsin Trust Co., Milwaukee, Wis., Trustee. Coupon, $100 (1934, 1936 and 1938 maturities only), $500 (1934 to 1939 incl., maturities only) and $1,000; registerable as to principal. Callable on any interest date on 30 days' notice at 100, plus ½% for each unexpired twelve months or part thereof, but not to exceed 102½. Secured by a direct first mortgage on all lands and buildings of the corporation in Milwaukee, Wis., appraised at $3,525,000 in March, 1927. Issued to fund current indebtedness and to increase working capital. Company pays normal income tax up to 2%.

Offered ($1,500,000) at par in Mar., 1927 by First Wisconsin Co., Milwaukee.

CAPITAL STOCK: 1. Pabst Corp. stock: Authorized, $5,000,000; outstanding, $2,875,700. Closely held.

PACIFIC DOOR & SASH CO.: Incorporated in 1918. Established in 1901.

In 1926 merged Pasadena Mfg. Co. of Pasadena, Burbank Planing Mill Co., Eureka Mfg. Co., of Burbank, Tom Merrell Sash & Door Co., Baker-Hickman Co., of Long Beach, Hepburn-Topham Mill Co. and Sunset Sash, Door & Mill Co., of Los Angeles. Manufactures doors, sash, windows and mill work. Also in production of cabinet work including Masterbilt and Eureka cabinets and wall fixtures. Company owns eight parcels of business and industrial property with an aggregate area of over 1,660,000 sq. ft. located in Los Angeles, Pasadena, Long Beach and Burbank, Cal., and two industrial leaseholds with a combined area of about 118,000 sq. ft. in Los Angeles and Long Beach, Cal. Main mill located on San Fernando Road, Los Angeles, Cal.

MANAGEMENT: OFFICER: C. L. Miller, Pres. OFFICE: Los Angeles, Cal.

BALANCE SHEET, as of Dec. 31, 1925 (giving effect to new financing): Capital stock, $418,100; bonded debt, $1,000,000; accounts payable, $302,470; accrued taxes, wages, etc., $98,296; other liabilities, $24,728; surplus, $2,142,688; total, $3,986,282. Contra: Plant and equipment, $2,379,778; cash, $99,453; notes and accounts receivable, $564,056; inventories, $734,838; other assets, $208,157; total, $3,986,282.

BONDED DEBT: 1. Pacific Door & Sash Co., first sinking fund gold 6s: Authorized, $1,000,000; outstanding, $1,000,000. Dated June 1, 1926; due June 1, 1941.

Interest paid J&D 1 at California Bank, Los Angeles, and at Anglo & London Paris National Bank, San Francisco. California Trust Co., Los Angeles, Trustee. Coupon, $500 and $1,000; registerable as to principal. Callable at 103 on any interest date on 30 days' notice. Minimum sinking fund beginning Dec. 1, 1927, of at least $3,500 monthly sufficient to retire 50% of issue by maturity; all money received by trustee on release of real property will be deposited in sinking fund and used to purchase or call bonds at not exceeding 103. Secured by first mortgage on fee title to eight parcels of business and industrial property with area of 1,660,000 sq. ft. and two industrial leaseholds with area of 118,000 sq. ft., including buildings and improvements thereon and all machinery and equipment. Issued to retire indebtedness and for working capital. Free of California state tax. Company pays normal income tax up to 2%.

Offered ($1,000,000) at 99 in June, 1926, by California Securities Co., Los Angeles.

CAPITAL STOCK: 1. Pacific Door & Sash Co., stock: Outstanding, $418,100; no further details reported.

PACIFIC IMPROVEMENT CO.: Incorporated under the laws of California, Nov. 4, 1878. Company was organized for the purpose of conducting construction, manufacturing, mining, mercantile, mechanical, banking and commercial business; for construction, leasing and operation

ATTACHMENT 6

MOODY'S

OTC INDUSTRIAL MANUAL

1984

P & F INDUSTRIES, INC.

History: Incorporated in Delaware in April, 1963; on July 31, 1963 merged Plastics & Fibers Inc. (N.J.) and assumed present name.

In 1983 acquired Florida Pneumatic Manufacturing Corp. for $3,000,000.

Business: Company is engaged in manufacturing baseboard heating equipment; fabricating and installing sheet metal duct work.

Property: Operates plants (leased) in following locations:
New Hyde Park, N.Y.
Farmingdale, N.Y.

Subsidiaries

Embassy Industries, Inc.
Triangle Sheet Metal Works, Inc.
Florida Pneumatic Manufacturing Corp.

Officers

Sidney Horowitz, Chmn. & Pres.
L.D. Feldman, Exec. Vice-Pres. & Treas.
Richard Horowitz, Vice-Pres. & Sec.

Directors

Sidney Horowitz | J.W. Wydler
L.D. Feldman | R.A. Horowitz
Stanley Horowitz

General Counsel: Moore, Berson, Lifflander, & Mewhinney.

No. of Stockholders: Mar. 28, 1984, 8,764.

Auditors: Seidman & Seidman.

Office: 111 Great Neck Rd., Great Neck, NY 11021. **Tel.:** (516)466-5200.

Consolidated Income Account, years ended Dec. 31 ($000 omitted):

	1983	1982	1981
Net sales	18,099	18,848	16,518
Other inc.	190	193	68
Total	18,289	19,041	16,586
Cost of sales	13,820	15,637	13,003
Selling, etc. exp.	3,368	2,781	2,736
Interest expense	429	416	432
Deprec.	197	146	136
Inc. contin. oper.	475	60	280
Earn., com. sh.	$0.02	Nil	$0.04
Loss discont. oper.	......	......	162
Income taxes	182	......	......
Extraord. credit	[5]182	......	[1]4,619
Net income	475	60	4,737
Prev. deficit	5,290	5,348	10,015
Dividends	108	1	1
Debit	......	......	[4]70
Deficit	4,922	5,290	5,348
[3]Earn., com. share	[2]$0.04	Nil	[2]$0.79
Yr.-end com. shs.	12,805,177	6,011,917	5,611,917

[1]Gain from settlement of lg. tm. debt. [2]$0.02 in 1983 and $0.01 in 1981 before extraord. credit. [3]As reported on 10,540,957 (1982, 5,648,307; 1981, 5,895,338) aver. shs. after pfd. divs. [4]Increase in carrying amt. of pfd. stk. based on amort. of excess of redemption val. over carrying amt. [5]Tax credit from loss carryfwd.

Consolidated Balance Sheet, as of Dec. 31 ($000 omitted):

Assets:	1983	1982
Cash & deposit	879	485
Accts. recv., net	6,917	5,778
[3]Inventories	1,225	1,608
Prepayments, etc.	477	348
Total current	9,498	8,219
[1]Net property, etc.	1,890	672
Other assets	419	77
Total	11,806	8,968
Liabilities:		
Notes payable	1,330	1,444
Loss discont. oper. prov.	180	197
Accts. payable	1,152	1,385
Accruals	1,062	771
Total current	3,723	3,797
Long-term debt	2,346	405
Def. inc.	......	1,396
Prior pfd. ($10)	23	23
Series A pfd. stk. ($10)	......	667
Common stock ($20)	2,562	1,203
Paid-in capital	8,082	6,773
Deficit	4,923	5,290
[2]Reacquired stk.	*dr*7	*dr*7
Total	11,806	8,968
Net current assets	5,775	4,422
[1]Depreciation	872	719

[2]5,453,shs. at cost. [3]Lower of cost or mkt.

Long-Term Debt: Outstdg. Dec. 31, 1983, $2,346,433 various loans payable thru Aug. 1989.

Capital Stock: 1. P&F Industries, Inc. 5% cum. prior pfd., par $10:

Auth., 20,000 shs. outstg., Dec. 31, 1983, 2,298 shs.; par $10.

Has first preference for assets and divs. Entitled to cum. divs. of 50 cents a sh. annually. Non-voting. Callable at $11 a sh. plus divs.

2. P&F Industries, Inc. common par 20 cents:
Auth., 20,000,000 shs.; outstg., Dec. 31, 1983, 12,805,177 shs.; in treas. 5,453 shs.; reserved for options, 912,500; reserved for warrants, 3,300,000; par 20 cents.

Dividends: 1964, 5% in stock; 1965-78, nil.

Has one vote per sh. No preemptive rights. For div. restriction, see long term debt above.

Offered (150,000 shs.) at $2 a sh. (proceeds to Co., $1.64 a sh.) on Feb. 8, 1961 by M.R. Zeller Co., NYC. Proceeds to repay loans, for expansion and working capital.

Offered (625,000 shs.) at $14 a sh. (proceeds to Co. $12.81 a sh.) on Jan. 16, 1968 by Auchincloss, Parker and Redpath, N.Y.C. and associates. Proceeds of 500,000 shares for general purposes.

Transfer Agent & Registrar: American Stock Transfer Co., N.Y.

Price Range:	1983	1982	1981	1980	[1]1979
High	1 1/4	1	1/2	3/8	3 3/4
Low	1/4	1/8	1/8	1/8	7/8

[1]1979 and prior, ASE.

Warrants: Outstg. Dec. 31, 1983, warrants to purchase 3,300,000 shs. of common stock at $0.75 per share thru May 16, 1984 and $1.00 per share thereafter expiring May 18, 1987.

Preferred Retired: 'As of Dec. 31, 1983 series A, non-voting cumulative preferred were retired and the remaining shares converted into common stock.

PAB OIL & MINING, INC.

History: Incorporated in Utah on August 30, 1968.

Business: Co. is engaged in the oil and gas as well as mining business.

Property: Co. maintains its principal office in Salt Lake City, Utah.

Officers

J.P. Bagdanich, Pres.
Donald Faulkner, Vice Pres.
M.W. Keogh, Sec./Treas.

Directors

J.P. Bagdanich | M.W. Keogh
Donald Faulkner

Auditors: Main Hurdman.

Counsel: Conder and Nielson.

Address: 47 West 200 South, America Plaza III, Salt Lake City, UT 84101.

Income Account, years ended Sept. 30 ($000 omitted):

	1983	1982
Revenues	147	131
Cost of sales	5	10
Selling, etc. exp.	68	86
Bad debt exp.	778	......
Aband. of assets loss	380	941
Oper. loss	1,084	906
Int. income	85	5
Total	*d*999	*d*901
Interest expense	26	46
Income taxes	[2]......	[2]......
Net loss	1,025	947
Earn., com. share	[1]*d*$0.09	*d*$0.10
Yr.-end com. shs.	11,353,156	9,603,156

[1]As reported on 10,959,931 aver. shs. [2]Amounted to $225.

Balance Sheet, as of Sept. 30 ($000 omitted):

Assets:	1983	1982
Cash	4	16
Total current	4	16
[1]Net property, etc.	1,316	1,597
Notes receiv.	9	......
Total	1,330	1,613
Liabilities:		
Notes payable	331	325
Accts., etc. payable	238	205
Income taxes	[2]......	[3]......
Total current	569	531
Long-term debt	172	217
Notes pay.	700	700
Common stock, ($0.02)	227	192
Paid-in capital	1,782	1,069
Deficit	2,120	1,095
Total	1,330	1,613
Net current assets	*d*565	*d*515
[1]Depreciation	40	27

[2]Amounted to $475. [3]Amounted to $450.

Auditors Report: The following is an excerpt from the Report of the Independent Auditors, Main Hurdman, as it appeared in 1983 Annual Report.

"As stated in Note 1, it is the Company's policy to deplete oil and gas properties under the straight-line method over an estimated useful life of ten years. Because of the unavailability of reserve information at September 30, 1983 and 1982, it was not possible to determine if such depletion was fairly stated.

As shown in the accompanying financial statements, the Company incurred net losses of $1,025,085 and $947,362 during the years ended September 30, 1983 and 1982, respectively, and as of those dates, the Company's current liabilities exceeded its current assets by $564,870 and $514,555. These factors among others indicate that the Company may be unable to continue in existence. The financial statements do not include any adjustments relating to the recoverability and classification of recorded asset amounts or the amounts and classification of liabilities that might be necessary should the Company be unable to continue in existence.

In our opinion, subject to the effects of such adjustments, if any, as might have been required had the outcome of the uncertainty about the recoverability and classification of recorded asset amounts and the amounts and classification of liabilities referred to in the preceding paragraph been known, and subject to the effects of depletion as discussed in the second preceding paragraph, such financial statements present fairly the financial position of PAB Oil & Mining, Inc. at September 30, 1983 and 1982, and the results of its operations and the changes in its financial position for the years then ended, in conformity with generally accepted accounting principles applied on a consistent basis."

Long-Term Debt: Outstg. Sept. 30, 1983 $172,063, less current portion $2,652 consisting of a purchase agreement.

Capital Stock: Com.; par $0.02:

Auth. 20,000,000 shs.; outstg. Mar. 1, 1984, 11,353,156 shs.; par $0.02.

Transfer Agent—Utah Stock Transfer.

Price Range: 1983, 1/4-1/8.

PABST BREWING CO.

History: Founded in 1844 in Milwaukee, Wis. by Jacob Best; incorporated in Wisconsin in 1873 as Phillip Best Brewing Co.; name changed to Pabst Brewing Co. in 1889 and reincorporated in 1920 as Pabst Corp., Wis. Business and assets merged in 1932 with Premier Malt Products Co. (incorporated in Delaware, July 10, 1924); name changed Mar. 1, 1933 to Premier-Pabst Corp. and present name adopted Dec. 23, 1938. Now a Delaware corporation.

In Dec. 1945, purchased all capital stock of Hoffman Beverage Co. (sold in 1961).

Early in 1948, company acquired Los Angeles Brewing Co. (merged in 1953).

On July 30, 1958, company acquired, and on Feb. 27, 1959 merged, business and assets of Blatz Brewing Co.

In late 1969 sold Blatz brand and certain related tangible assets to G. Heileman Brewing Co.

In Apr. 1975 acquired Burgermeister and Burgie beer brands from Theodore Hamm Co.

In Apr., 1979, acquired assets and brands of Blitz-Weinhard Co., Portland, Ore.

In Apr. 1983, sold its Peoria Heights, Ill., brewing facility.

Merger—Acquisition: Effective Mar. 18, 1983, Co. consummated merger and other related transactions with Olympia Brewing Company ("Olympia") and G. Heileman Brewing Company, Inc. ("Heileman"). The Company acquired the remaining equity interest in Olympia through the issuance of 5,331,000 shares of common stock having a then guaranteed value of $34,653,000. The acquisition of Olympia was accounted for as a purchase and accordingly, the purchase price was allocated to assets and liabilities acquired based upon fair values at the acquisition date. Contemporaneously with the acquisition. Heileman purchased certain assets and brands of the combined companies in exchange for 24,000,000 shares of the Company's common stock.

The remaining outstanding common stock (exclusive of the shares issued to the former Olympia stockholders) was exchanged for subordinated notes of $52,453,000. The acquisition of the Co.'s stock resulted in the write-off of certain intangible assets and the write-down of certain properties to fair value. For accounting purposes, a new entity was deemed to be created, although Pabst is the surviving entity for legal and tax purposes.

In connection with the transfer of assets, Co. and Heileman entered into a brewing arrangement requiring Co. to purchase from Heileman approximately 13,000,000 barrels of the Co.'s brands over a five year period. Co. will reimburse Heileman for actual costs including an administrative fee. The agreement provides for declining minimum annual barrelage requirements which if not attained result in paying the fixed brewing costs including the administrative fee associated with the minimum requirement.

Business: Principally engaged in production and sale of beer. Other products sold include enzymes for textile and dry cleaning business and industrial fermented products.

Properties: Has breweries at Milwaukee, Wisc., Newark, N.J., Tumwater, Wash., Tampa, Fla.

Officers

T.N. McGowen, Jr., Chmn.
J.C. Brzezinski, Exec. Vice-Pres.

Vice-Presidents

W.G. Bowen | A.J. Dooley, Jr.
R.J. Ratcheson | J.P. Murphy
P.D. Israel

J.J. Culhane, Vice-Pres. & Gen. Counsel.
D.L. Schmidt, Contr.
C.L. Wallace, Treas.
N.W. Bergemann, Asst. Sec. & Asst. Treas.

Directors

F.P. Stratton, Jr. | D.W. Gittinger
T.J. Donnelly | I.C. Herbert
T.N. McGowen, Jr. | P.F. Pauly
K.F. Hoenecke | R.S. Troubh
R.A. Schmidt | W.E. Kimberly
W.E. Smith, Jr.

Auditors: Price Waterhouse

Annual Meeting: In April.

No. of Stockholders: Dec. 31, 1983, 6,600.

No. of Employees: 1983 (A

Executive Office: 1000 N. Market St., P.O. Box 766, Milwaukee, WI 53201. **Tel.:** (414)347-7300.

Consolidated Income Account, years ended Dec. 31 ($000 omitted):

	[4]1983	1982	1981
Sales	799,988	758,602	811,523
Cost of sales	543,552	531,608	599,324
Fed. exc. taxes	112,953	109,436	119,659
Sell., etc., exp.	129,743	105,610	105,746
[1]Oper. profit	13,740	11,948	d13,206
Interest income	975	2,756	4,108
Total income	14,715	14,704	d9,098
Interest exp.	9,950	3,567	1,965
Plant clos. prov.	3,317	3,241	39,791
Oth. deduct.	612	3,600	cr293
Income taxes	3,100	1,125	cr27,025
[3]Equity loss	765	478	......
Net income	3,605	2,693	d23,536
Prev. ret. earn.	265,149	265,729	292,538
Dividends	......	3,273	3,273
Retire. of shs.	266,404	......	......
Retain. earn.	2,350	265,149	265,729
[2]Earn., com. sh.	$0.31	$0.08	d$0.72
Yr. end com. shs.	6,195,000	8,185,541	8,185,541

[1]After $20,549,000 (1982, $30,394,000; 1981, $32,110,000) depec. [2]On 11,795,000 (1982, 32,742,000; 1981, 32,733,000) aver. shs. adj. for 4-for-1 stk. split 6/83. [3]Equity in net loss of Olympia Brewing Company. [4]Incl. remaining interest in Olympia Brewing Company from March 18, 1983 date of acq.

Consolidated Balance Sheet, as of Dec. 31 ($000 omitted):

Assets:	1983	1982
Cash & equiv.	5,406	17,655
Mkt. secur.	153	7,000
Accts. rec., net	24,443	20,902
[2]Inventories	63,796	63,512
Prepay., etc.	3,051	4,252
Total current	96,849	113,321
[1]Net prop.	123,779	213,082
Investment	......	36,778
Intangible assets	......	15,814
Prop. for sale	......	10,938
Notes receiv.	7,388	2,134
[5]Leased prop., net	4,132	7,007
Bottles, etc.	8,832	8,659
Other assets	2,935	1,206
Total	243,915	408,939
Liabilities:		
Lease oblig. due	1,566	5,277
Accts. payable	54,143	45,905
Accruals	15,022	13,790
Fed. exc., etc. tax	10,189	6,803
Income taxes	8,970	654
[6]Other liab.	14,595	13,700
Accr. plt. costs	......	4,237
Total current	104,485	90,366
Bank debt	76,810	33,782
Cap. lease oblig.	3,186	5,061
Other liab.	4,980	......
Def. inc. tax	17,451	25,475
[3]Com. stock	[7]34,653	9,726
Retain. earn.	2,350	265,149
Treasury stk.	......	[4]dr20,620
Total	243,915	408,939
Net curr. assets	d7,636	22,955
[1]Deprec.	123,295	184,041

[2]Lower cost moving average basis or mkt. [3]No par shs.: 1983, 6,195,000; 1982, 9,524,338. [4]1,338,697 shs. at cost. [5]After $11,063,000 (1982, $14,555,000) deprec. [6]Liability to customers for returnable containers. [7]After deduct. 4,420,000 guaranteed employee stock ownership plan debt.

Long Term Debt: Outstanding Dec. 31, 1983, $85,138,000 consisting of:
(1) $18,580,000 revolving bank loan.
(2) $4,420,000 guarantee of ESOP loan.
(3) $52,453,000 15% subordinated notes.
(4) $1,519,000 industrial revenue bonds.
(5) $3,186,000 obligations under capital leases.
(6) $4,980,000 other.

In Mar., 1983, Co. refinanced its revolving bank loan under loan commitments aggregating $43,487,000 issued by a consortium of five domestic banks. Borrowings pursuant to these commitments are due Mar., 1985 and bear interest at prime plus ½ of 1% (11.5% at Dec. 31, 1983). A commitment fee of ½ of 1% per year is payable on all unused funds. The loans are secured by all assets of the Co. and contain working capital and dividend restrictions. The available credit under the commitments is reduced by outstanding guarantees of the ESOP debt and letters of credit of $4,420,000 and $5,186,000, respectively, at Dec. 31, 1983.

In connection with the merger and other related transactions, Co. issued 15% subordinated notes due March, 1993. The Notes are unsecured and are subordinated to the revolving bank loans. The Note indenture specifies the establishment of a sinking fund commencing Mar., 1988.

The industrial revenue bonds which were originally secured by the St. Paul facility bear interest at 7½% to 8½% and are currently secured by a letter of credit included in the total above.

Capital Stock: Com.; no par:
AUTHORIZED—8,000,000 shares; outstanding, Dec. 31, 1983, 6,195,028 shs.; reserved for options, 396,000 shs.; reserved for employee stock ownership plan, 680,000 shs.; no par.

No par shares split 3-for-1 Apr. 4, 1949 and 2-for-1 Apr. 18, 1969 and 4-for-1 in June, 1983.

DIVIDENDS—(payments since 1940 follow):

On no par shares:
1941-45 ...$1.10 1946 ......$2.00 1947-48 ....$3.00
1949 ....0.75

On no par shares (after 3-for-1 split):
1949 ....1.00 1950-52 .....1.40 [1]1953 ....0.75
1954 ....1.00 1955 ....0.70 1956 .....0.52½
1957 ....0.20 [1]1958-61 ...Nil 1962 .....0.50
1963-65 .....0.50 1966 ....0.75 1967-68 ...1.00
1969 ....0.25

On no par shares (after 2-for-1 split):
1969 ....0.45 1970 ....0.65 1971 ....0.80
1972 ....0.83 1973 ....0.86 1974 ....0.91
1975 ....1.01 1976 ....1.06 1977 ....1.14
1978 ....1.20 1979-80.....0.40 1981 ....0.30
1982 ....0.40 1983 ....0.10

[1]Also stock dividends: 1953, 2%; 1960, 5%.

TRANSFER AND DIVIDEND DISBURSING AGENT AND REGISTRAR—American National Bank, Chicago, Ill.

NASDAQ Symbol: PABT.

PRICE RANGE—	[1]1983	1982	1981	1980	1979
High	16½	31⅛	18⅞	17⅛	17¾
Low	3⅝	12½	11⅝	10¾	10¾

[1]Adj. for stk. split.

Capital Restructuring: Contemporaneously with the merger and related transactions (see above), all outstanding shares of common stock were retired on Mar. 18, 1983 and 5,331,000 shares of new common stock were issued to the former Olympia stockholders as the continuing equity interest in Co. Co.'s Certificate of Incorporation has been amended to provide for 8,000,000 authorized shares of no par value common stock and 2,000,000 authorized shares of no par value preferred stock. The newly issued shares of common stock have been recorded at their Mar. 18, 1983 guaranteed value of $6.50 per share.

PACER TECHNOLOGY & RESOURCES, INC.

History: Co., which operated as a sole proprietorship during 1975, incorporated in California in Feb., 1984, successor to corporation incorporated in Wyoming on Sept. 2, 1975, but did not commence corporate operations until Jan. 1, 1976. In 1978, Co. went public.

Joint Venture: Co. has an agreement with Sumitomo Chemical Co., Ltd. to design and manufacture all containers utilized for packaging its products, and to market and distribute Co.'s products throughout the world.

Business: Co. is engaged in the business of packaging and marketing cyano-acrylate, anaerobic, second generation acrylics, and epoxy adhesives for sale, under private labor trademarks and its own proprietary trademarks both consumer oriented and industrial distributors.

Property: Co. leases office, laboratory, storage, filling and packaging facilities consisting of approx. 35,000 sq. ft. of space in Campbell, Cal.

Officers

J.G. Hockin, II, Chmn. & Chief Exec. Officer.
R.R. Woods, Pres. & Chief Exec. Off.
Frank Milo, Vice-Pres.—Sales
C.A. Mattila, Vice-Pres.—Fin., Sec. & Treas.

Directors

H.J. McCormick
J.G. Hockin
J.F. Brock
G.D. Burdsall
S.M. Gunther

Auditors: Sappington Simons & Hopkinson.

General Counsel: Firm of Pettit & Martin Charles Quantz.

No. of Stockholders: Sept. 19, 1983, 3,400.

No. of Employees: June 30, 1982, 85.

Address: 1600 Dell Ave., Campbell, CA 95008. **Tel.:** (408)379-9701.

Income Account ($000 omitted):*

	Yrs. ended 6/30/83	Yrs. ended 6/30/82	6 mos. to 6/30/81
Net sales	4,369	4,858	2,430
Cost of sales	3,767	4,557	1,846
Sell., etc., exp.	1,396	1,609	836
Oper. loss	794	1,309	252
Other income	dr57	40	146
Total	d851	d1,269	d106
Income taxes	[2]......	[2]......	7
Acctg. chge.	......	......	[3][3]dr123
Net loss	851	1,269	236
[1]Earn., com. sh.	d$0.12	d$0.21	[4]d$0.04
Yr. end com. shs.	9,359,803	6,216,950	6,076,700

[1]As reported on 7,035,360 (1982, 6,184,491; 1981, 6,062,678) aver. shs. [2]Amounted to $200. [3]Cumulative effect on prior yrs. (to Dec. 31, 1980) of chge. in method of acctg. [4]d$0.02 before acctg. chge.

Balance Sheet, as of June 30 ($000 omitted):

Assets:	1983	1982
Cash	68	30
Receiv., net	1,278	744
[2]Inventories	567	878
Prepaid expenses	22	44
Total curr.	1,935	1,696
[1]Net prop., etc.	1,154	1,379
Other assets	91	115
Total	3,180	3,190
Liabilities:		
Notes, etc. pay.	......	227
Accts., etc. pay.	636	441
Other curr. liabil.	91	174
Total curr.	726	842
Com. stk. ($0.01)	94	62
Contrib. capital	4,730	3,804
Deficit	2,369	1,518
Total	3,180	3,190
Net curr. assets	1,209	854
[1]Depreciation	842	551

[2]Lower of cost (fifo) or mkt.

Auditor's Report: The following is an excerpt from the Report of the Independent Auditors, Dearden Farrow, as it appeared in 1983 Annual Report.

"The balance sheet of PACER TECHNOLOGY AND RESOURCES, INC. as of June 30, 1982 and the related statements of operations, stockholders' equity and changes in financial position for the year ended June 30, 1982, for the six months ended June 30, 1981 and for the year ended December 31, 1980 were examined by other auditors whose opinion, dated September 3, 1982, was qualified as being subject to the effects on the 1982 financial statements of such adjustments, if any, as might have been required had the outcome of the following uncertainties been known.

As of June 30, 1982 there were uncertainties as to the continuation of the business as a going concern, the realization of the carrying amounts of the assets, the amount and classification of the liabilities, the ability of the Company to maintain adequate working capital and its ability to obtain additional financing.

During the year ended June 30, 1983, the Company incurred a net loss of $851,000. The Company's ability to continue as a going concern is dependent upon its ability to restore and maintain profitable operations. It is not possible to predict the outcome of future operations. The financial statements do not include any adjustments relating to the recoverability and classification of recorded asset amounts or the amounts and classification of liabilities that might be necessary should the Company be unable to continue in existence.

In our opinion, subject to the effects on the 1983 financial statements, if any, as might have been required had the outcome of the uncertainties referred to in the preceding paragraph been known, the 1983 financial statements referred to above present fairly the financial position of PACER TECHNOLOGY AND RESOURCES, INC. as of June 30, 1983 and the results of its operations and the changes in its financial position for the year then ended, in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year."

Capital Stock: Com.; par $0.01:

Auth., 10,000,000; outstg., June 30, 1983, 9,359,803 shs.; warrants, 500,000 shs.; reserved for options, 205,000 shs.; par $0.01.

Entitled to one vote per sh., with cumulative voting for directors. No preemptive rights.

Offered (1,000,000 shs.) at $1 per sh. (proceeds to Co., $0.90 per sh.) on Sept. 14, 1978 thru American Western Securities, Inc. and associates. Proceeds to purchase laboratory and production equipment, employee compensation, advertising, marketing and promotion, research and development, officer's salary and repayment of debt.

Transfer Agent: Executive Registrar & Transfer Agency, Inc., Albuquerque, N.M.

NASDAQ Symbol: PTRI.

Price Range:	1983	1982	1981	1980	1979
High	2⅞	2⅝	6⅜	7⅞	3⅜
Low	1	⅝	1⅞	2⅛	1⅛

Warrants: Outstg., June 30, 1983, warrants to purchase 100,000 shs. at $1.20 per sh. expiring Oct. 1983.

Private Placement: Co. reported in April 1983 that it sold 2,857,143 com. shs. to a limited number of investors in a private placement. The shares are restricted and brings the Co.'s outstanding total to 9,359,803 com. shs.

PACESETTER CORP.

History: Inc. in Neb. Sept. 9, 1964 as Pacesetter Products Mfg., Inc.; Name changed to Pacesetter Building Systems, Inc. in Oct. 1971; present name adopted Sept. 26, 1978.

On July 31, 1971, Co. acquired all outstg. stock of Pacesetter Products, Inc., a Neb. corp., Pacesetter Products, Inc., a Minn. corp., Pacesetter Products, Inc., a Mo. corp., and Pacesetter Investment Real Estate Co., a Neb. corp., in exchange for 372,822 com. shs.

Business: Co. is a direct retail marketer and producer of custom residential improvement products through a network of 47 sales and service centers located as follows:

Alabama	Missouri
Arizona	Nebraska
Colorado	New Mexico
Georgia	North Dakota
Illinois	Ohio
Indiana	Oklahoma
Iowa	South Dakota
Kansas	

LPRSA0159774

ATTACHMENT 7

Pabst Brewing Company - History.

277 words
21 July 2004
Datamonitor Company Profiles
English

Pabst Brewing Company was founded in 1844, when German immigrant Jacob Best and his four sons opened a brewery on Chestnut Street Hill in Milwaukee. In the mid-1850's Phillip Best, one of Jacob's sons, set up the brewery's first branch sales office and warehouse in Chicago.

Captain Frederick Pabst bought a half interest in the brewing company in 1864 when the plant's production was 5,000 barrels a year. Nine years later, the output was 100,000 barrels and Captain Pabst was president of the company.

Pabst was purchased by the Californian company, **S&P Co**., in 1985, and moved its headquarters to San Antonio.

Pabst Brewing Company was owned by S&P and closed its Milwaukee brewing operations in 1996, due to an inability to compete in an increasingly competitive market.

S&P acquired additional brands in 1999, when it purchased the Stroh Brewing Co through its Pearl Brewing subsidiary. These included the brands: Colt 45, Lone Star, Old Milwaukee, Old Style, McSorley's, Schaefer, Schlitz, Schmidt's, Special Export, Stroh and Rainier.

In July 2000, following a six and a half year legal battle, ownership of S&P and its subsidiaries, including **Pabst Brewing**, was given to the Kalmanovitz Charitable Trust, a provider of funding to colleges, universities and hospitals.

This was followed by the 2001 closure of Pabst's Texas and Pennsylvania based breweries and the sale, in 2002, of the Pearl Brewery site to Silver Ventures. Pabst became a "virtual brewery", with the Miller Brewing Company brewing its beers while it retained ownership of its brands and marketed the products.

Document DATMON0020040720e07l003mq

ATTACHMENT 8

HOOVERS™
A D&B COMPANY

Pabst Brewing Company

121 Interpark Blvd.
Ste. 300
San Antonio, TX 78216-1852 (Map)
United States
http://www.pabst.com

Phone: 210-226-0231
Toll Free: 800-935-2337
Fax: 210-299-6807

BASIC FINANCIAL INFORMATION

Company Type	Private Headquarters
Fiscal Year-End	June
2003 Sales (mil.)	$600.0 (est.)
1-Year Sales Growth	4.3%

ATTACHMENT 9

H+GCL
Environmental Scientists and Engineers

:21 Forbes Blvd., Ste. 240 • Lanham, MD 20706
(301) 459-9677 • FAX: (301) 459-3064

March 26, 1992

Mr. Douglas Burry
Bureau of Underground Storage Tanks
Ground Water Quality Management Element
Division of Water Resources
NJ DEP
401 E. State Street
Trenton, New Jersey 08625

RE: SUBMITTAL OF THE DISCHARGE INVESTIGATION AND CORRECTIVE ACTION REPORT (DICAR) FOR PABST BREWERY, NEWARK, NEW JERSEY

Dear Mr. Burry:

H⁺GCL is pleased to submit two copies of the above referenced report on behalf of Pabst Brewing Company. We have enclosed the DICAR Summary Sheet with an original signature of the qualified Hydrogeologic Consultant. However, the form was forwarded to H⁺GCL via a facsimile transmission and therefore, the signature of the Pabst Brewing Company representative is not original. H⁺GCL will provide a form containing both original signatures at your request, however, an original form must be provided to H⁺GCL.

Yours very truly,
H⁺GCL

Carol Wilson Hodges

Carol Wilson Hodges
Director, Mid-Atlantic Region

CWH/gn/H:/46018/BURRY1.LTR

Enclosures (3)

cc: Mr. Syl Dew, Pabst Brewing Company
Mr. Joesph McGinley, Newark Department of Health

IST #0161255

DS87/90 3/26/

DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF UNDERGROUND STORAGE TANKS
DICAR SUMMARY SHEET

Case # 91-11-27-1214-05

Fill in "Yes" "No" "N/A" (non-applicable) or "U" (unknown) after each completed statement and the appropriate response after each uncompleted statement. Explain any "No" "U" or "N/A" responses.

1.) The substance(s) discharged was (were) Petroleum-Hydrocarbons

2.) The highest ground water contamination at any 1 sampling location and at any 1 sampling event to date has been determined to be:
a.) 38800 ppb total BTEX, 15200 ppb total non-targeted VOC
b.) ______ ppb total B/N, ______ ppb total non-targeted B/N
c.) 100 ppb MTBE, 1500 ppb TBA
d.) ______ ppb ______ (for non-petroleum substance)
e.) greatest thickness of separate phase product found none
f.) separate phase product has been delineated n/a

3a.) A well search (including a review of manual well records) indicates that private, municipal or commercial wells do exist within the distances specified in the Scope of Work. yes
b.) The number of these wells identified is 3 .

4a.) The shallowest depth of any well noted in the well search which may be in the horizontal or vertical potential path (s) of the contaminant plume(s) is 214 feet below grade (consideration has been given for the effects of pumping, subsurface structures, etc. on the direction(s) of contaminant migration). This well is U feet from the source and its screening begins at a depth of 23 feet. - actually no screen - casing stops at 23'
b.) The shallowest depth to the top of the well screen for any well in the potential path of the plume(s) (as described in #4a above) is 23 feet below grade. This well is located U feet from the source.
c.) The closest horizontal distance of a private, commercial or municipal well in the potential path of the plume (as determined in #4a) is U feet from the source. This well is 214 feet deep and screening begins at a depth of 23 feet.

5.) A plan for separate phase product recovery has been included. n/a

6.) A ground water contour map has been submitted which includes the ground water elevations for each well. yes

7.) Any vapor hazards which the consultant or the client have become aware of have been mitigated. n/a

FNC000260

8a.) The ground water contaminants have been delineated to MCLs or lower values at the property boundaries. n/a
b.) The plume is suspected to continue off the property at concentrations greater than MCLs. no
c.) Off property access: is being sought/ has been approved/ no

9.) Boring logs have been included. yes

10.) The scaled site map includes the following:
a.) north arrow and scale yes
b.) locations of above ground structures yes
c.) locations, depths & function of sub-surface structures yes
d.) locations, depths and contents of the removed tank(s) no
e.) locations of wells and the well permit #s yes
f.) analytical results of all ground water samples no
g.) locations of surface water bodies n/a

11a.) All free product contaminated soil, on the property boundaries and above the water table are believed to have been removed from the subsurface. no
b.) free product contaminated soils are suspected to exist below the water table. yes
c.) free product contaminated soils are suspected to exist off the property boundaries. no

12.) The registration number(s) for the investigated tanks have been provided in this report. yes

****

This form must be signed by the qualified ground water consultant responsible for reviewing or preparing the contents of the report AND by the owner/operator who is submitting this report.

"I certify under penalty of law that the information provided in this document is true, accurate and complete and was obtained by procedures in compliance with N.J.A.C. 7:14B-8. I am aware that there are significant civil and criminal penalties for submitting false, inaccurate or incomplete information, including fines and/or imprisonment."

Consulting Firm: H+GCL

Name of Consultant: B. Virginia Nicholas

Signature: B.V. Nicholas CPG 8031 Date: 3-26-92

Phone #: (301) 459-9677

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this transmittal and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate and complete. I am aware that there are significant civil and criminal penalties for submitting false, inaccurate or incomplete information, including the possibility of fines and/or imprisonment."

Owner/Operator's Company Name: Pabst Brewing Company

Owner/Operator's Name: [illegible signature]

FNC000261

TOTAL P.03
03.13.92 01:33 PM

DISCHARGE INVESTIGATION AND CORRECTIVE ACTION REPORT
PABST BREWING COMPANY
NEWARK, NEW JERSEY

March 26, 1992

Prepared for:

Mr. Syl Dew
Pabst Brewing Company
312 Pearl Parkway
San Antonio, Texas 78215

Prepared by:

H+GCL

4221 Forbes Boulevard
Suite 240
Lanham, Maryland 20706
(301) 459-9677
FAX (301) 459-3064

FNC000262

Table of Contents

List of Figures

List of Tables

List of Appendices

List of Plates

1.0 Introduction

The Pabst Brewing Company (Pabst) is located in the City of Newark, Essex County, New Jersey (Figure 1-1). ENSR Remediation and Construction Inc., (ENSR) was contracted by Pabst Brewing Company in May 1991 to close nine underground storage tanks (USTs) at the site, by excavation and removal or closure in-place. In conjunction with the tank closure, soil samples were collected by ENSR for a limited site characterization in the immediate vicinity of the former UST locations. ENSR also installed three ground-water monitor wells and thirteen soil borings around three USTs (tanks E5, E7, and E8) suspected as a source of petroleum-based hydrocarbon contamination, to document the horizontal and vertical extent of the soil and ground-water contamination. H⁺GCL was retained by Pabst Brewing Company in February 1992, to prepare a Discharge Investigation and Corrective Action Report (DICAR) for these three USTs.

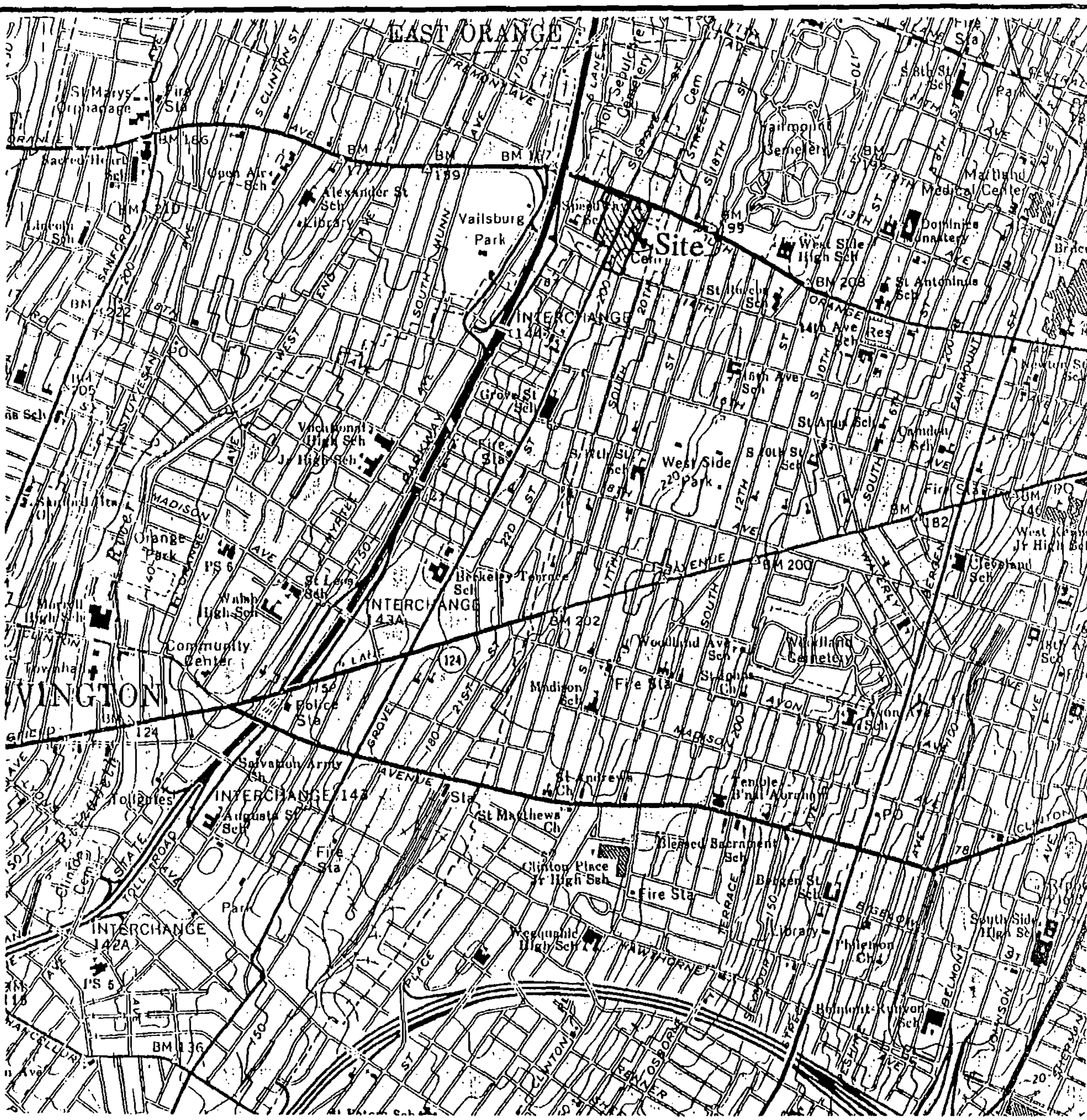
The facility originated as E. Hoffman & Son Soda and Mineral Water Works (Hoffman) in 1924, utilizing Buildings 1, 2, 3, 4, 7, and 26 (Figure 1-2). Prior to the Hoffman development in the area, the site was subdivided into residential lots with some lots developed and the remainder unimproved (1909 Sanborn Fire Insurance Map). Hoffman and Pabst had joint tenancy and production facilities for an undisclosed amount of time before or after Pabst bought the property from Hoffman Beverage on November 15, 1946, according to land records at City Hall in Newark, N.J. The facility has been closed since July 1985.

Pabst had at least nine USTs throughout the site utilized for the storage of heating oil and motor fuel. Since the facility was not located near a railroad siding, all ground transportation was provided by trucks which would utilize the stored motor fuel. USTs associated with the facility were first recorded in 1926, according to Sanborn maps, with one UST located on an off-site property which is presently within the Building 8 footprint. Additional USTs were installed with the construction of new garages and other buildings as the facility expanded. The precise age and location of all former and current USTs located on property now owned by Pabst was not available.

Section 2.0 provides a description of the site characteristics. Section 3.0 discusses tank closure activities conducted by ENSR and Section 4.0 presents the results of the site investigation. The evaluation and recommendations for corrective action are included in Section 5.0 and Section 6.0 presents a list of references used during report preparation.

Figure 1-1

Site Location Map



Approximate Scale
in Feet

0 1000 2000 3000 4000

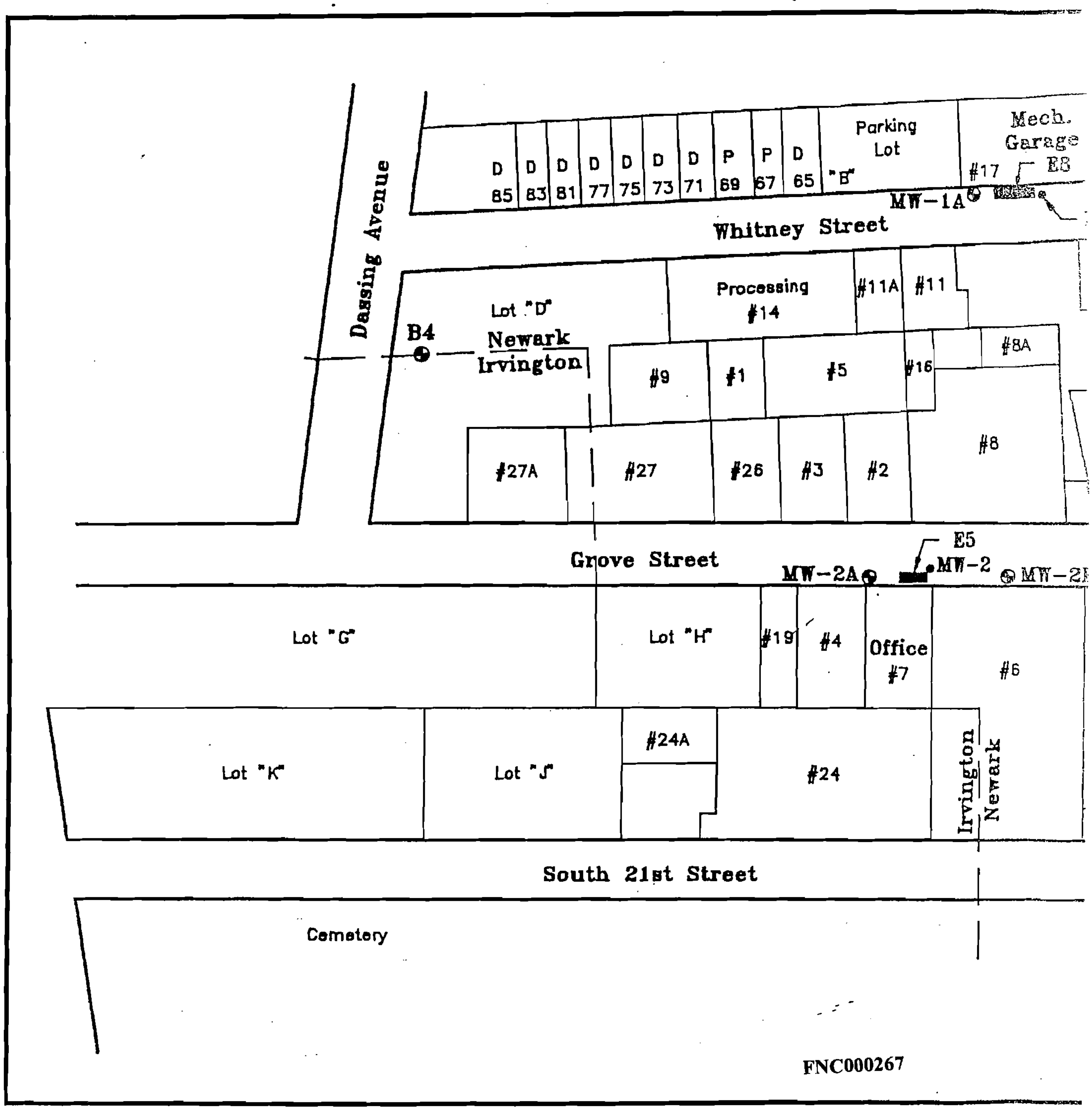
North

FNC000266

Taken from United States Geological Survey 7.5 Minute Quadrangle, Elizabeth, New Jersey

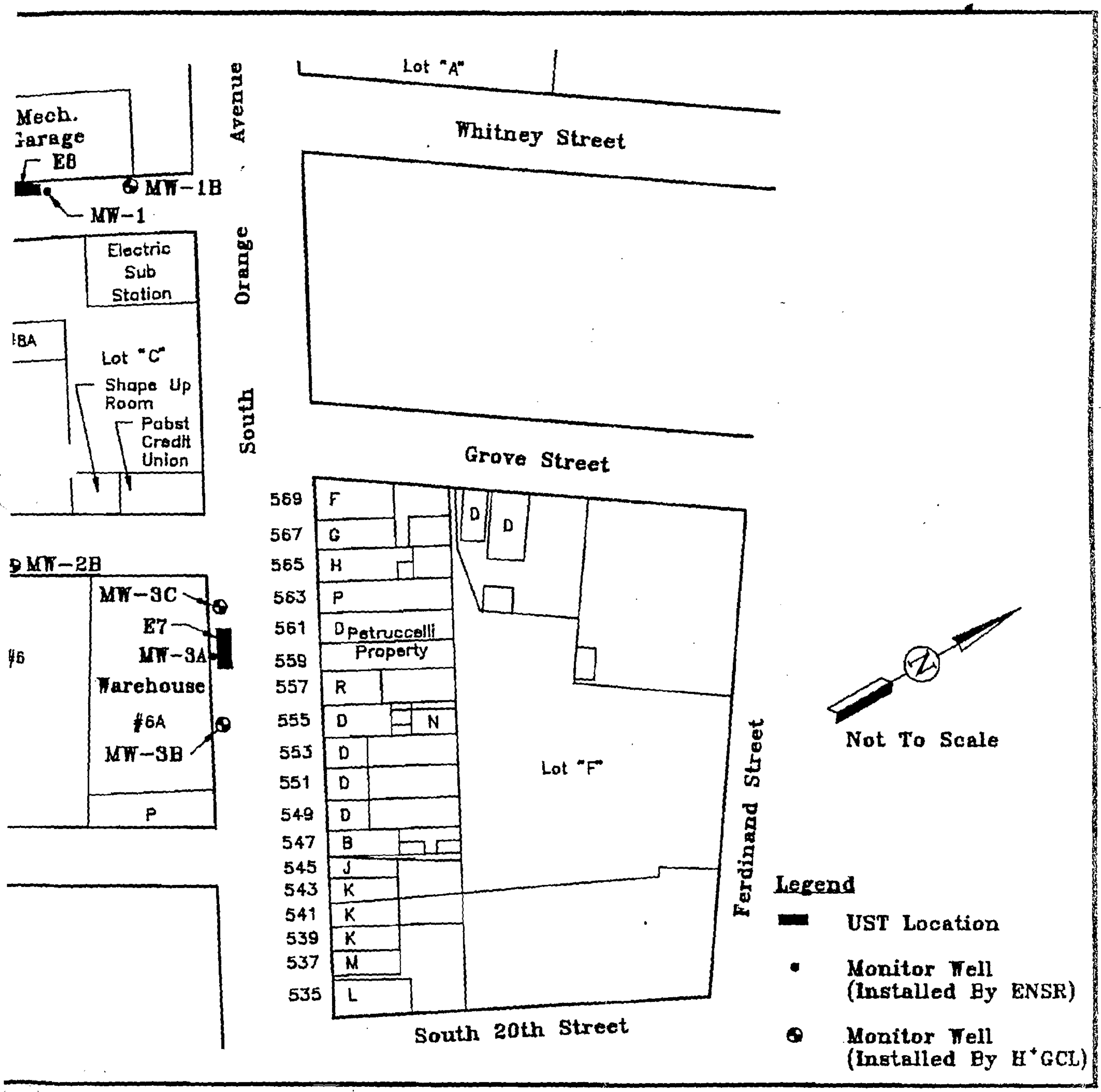
Figure

Site M



gure 1-2

ite Map



FNC000268

2.0 Site Characterization

The New Jersey Bureau of Underground Storage Tanks requires that a Discharge Investigation and Corrective Action Report (DICAR) include an investigation of the nature of the sites surrounding an UST area under investigation. This includes identifying potential receptors, and possible effects, if any, of a petroleum release into the environment on public or private water supply.

2.1 Surrounding Area

The Pabst Brewing Company's Newark facility is located within a commercial and residential area. The brewery is the only industrial property in the immediate vicinity of the site. Two major streets, South Orange Avenue and Grove Street, pass directly through the site. The Garden State Parkway is located 500 feet to the west of the site and Route 280 is located one mile to the north.

Within a quarter of a mile radius of the site there are three cemeteries, one elementary school and the South Orange Avenue, Garden State Parkway interchange. The brewery straddles the Newark and Irvington City Lines. Within a half mile radius of the site there are an additional three elementary schools, one high school, another cemetery and Vailsburg Park. The area between the schools and the cemetery is residential with local commercial areas. The surrounding population receives potable water from the city, supplied from above-ground reservoirs, not local ground water.

With the exception of the cemeteries and park, the majority of the surrounding land is covered by asphalt or concrete. Row houses comprise the majority of the individual lots which does not allow for much unimproved land. The county of Essex, in which the city of Newark is located, is one of the most populated counties in New Jersey due to its proximity to New York City.

2.2 Climate

The climate of Essex County is controlled by weather systems originating from the northwest in October to April and from the southwest during the remaining months. As a result, the winter weather is controlled by cold continental air masses from the Great Lakes and Canada, and the summer weather is controlled by tropical air masses from the Gulf of Mexico. In the eastern part of Essex County, the average January temperature is about 39°F and the average July temperature is about 74°F.

2.3 Topography and Geology

The site is located in the Piedmont Physiographic Province. The Piedmont is described as a lowland of gently rounded hills separated by wide valleys with some ridges and isolated hills rising conspicuously above the general surface. The Piedmont generally slopes from approximately 400 feet above mean sea level (MSL) in the northwest part of Essex County to sea level at Newark Bay. The elevation of the site is between 200 and 180 feet above MSL and the site is located at latitude N 40°46' and longitude 74°12' W. The surface topography of the site slopes gently to the north and northwest. The closest body of surface water is an unnamed reservoir on South Orange Avenue located 0.6 miles east of the site.

The site is underlain by Triassic-aged sandstone and shale of the Brunswick Formation, with interbedded basalt layers of the Watchung Formation. The Brunswick Formation consists chiefly of soft red shale with some interbedded sandstone, according to the Geology of New Jersey (State of New Jersey Department of Conservation and Development, 1940). The thickness of the Brunswick Formation has been estimated to be between 6,000 and 8,000 feet. The source of the sediment that comprise the majority of the shale is believed to be from the weathering of pre-Cambrian crystalline rocks, due to the presence of fine grained mica throughout the formation. The overburden at the site ranges in thickness from 20 to 30 feet. Ground water in the Watchung Formation occurs under both confined and unconfined conditions. Shallow ground water is also present at the site in overlying unconsolidated materials. Wells near the site that are used for water supply are completed in the underlying shale and sandstone bedrock.

2.4 Potential Receptors

A limited well search was conducted within a quarter mile radius of the site. Three well logs were found in the New Jersey Department of Environmental Protection's (NJ DEP) well record file. One well was located on the site and was installed in 1949 by Hoffman to supply water for refrigeration. The well was 685 feet deep and completed in the Watchung Formation, with a reported static water level at 59 feet below the ground surface. A second well was installed in the city of Irvington for Fezem Memorial Home's air conditioning. The Memorial Home was formerly located at the corner of Grove Street and 14th Avenue, which is currently in Lot "G" of the Pabst facility. This well was located upgradient from the UST sites, and was 304 feet deep with a reported static water level at 75 feet below the surface when installed in 1952. This well was also completed in the Watchung Formation. Both of these wells are no longer in use.

The only well record encountered downgradient from the Pabst site was installed at an undisclosed time, believed to be in the 1950's, at a Food Fair Store. The store was located approximately two blocks west of the Pabst facility on South Orange Avenue. This well was completed in the Watchung Formation and was 214 feet deep with a reported static water level of 17 feet below the surface, and it was used for air conditioning. The status of this well is unknown.

The closest standing body of surface water is a reservoir located 0.6 miles east of the site on South Orange Avenue. The origin of the Elizabeth River is located approximately one mile southwest of the site. The Newark City Water and Sewer Department provides service to the entire city with water supplied from above-ground reservoirs.

Tank E8, which contained unleaded gasoline, was located in front of the mechanical garage. This tank appeared on the 1950 Sanborn map, but was not present on the 1926 Sanborn Map, even though the garage existed in 1926. It is assumed that the 1950 tank is the same tank as the one ENSR closed.

Tank E9 was located in front of Building 6 and contained #2 fuel. The building was constructed in 1929, so the tank could have been installed anytime from the late 1920s to the present.

Of the nine UST systems closed by ENSR, three required additional characterization based upon initial sample results. The characterization, known as DICAR was required for UST systems E5 (a 4,000 gallon, steel, #2 diesel fuel tank), E7 (two tandem 2,000 gallon, steel, leaded gasoline tanks), and E8 (a 1,000 gallon, steel, unleaded gasoline tank) (Figure 3-1).

Volatile organic compounds (VOCs) present above detection limits and the presence of total petroleum hydrocarbons (TPH) over 1000 ppm both require preparation and submission of a DICAR. Tank E5 had six soil samples submitted for TPH analysis by ENSR and three of the samples had concentrations over the 1,000 ppm action limit established by the NJ DEP. Tank E7 had nine soil samples submitted for analysis of VOCs. All nine samples had VOCs above the detection limit. Tank E8 had four soil samples collected and three of the samples had VOCs reported over the detection limit/action level. Therefore, these three tanks are required to have a DICAR. The following two sections of this report discuss the results of the DICAR investigation conducted by H^+GCL.

3.0 Underground Storage Tank Closure

ENSR closed nine UST systems located at the Pabst facility between September 1991 and January 1992 (Figure 3-1). The USTs were closed in accordance with ENSR's UST Closure Plan (dated May 1991 and revised November 1991), which was approved by the NJ DEP. All of the following information regarding the UST closure and soil and ground-water sampling conducted by ENSR is based solely on their UST Closure Summary Report dated March 11, 1992. Where appropriate, their figures and data have been duplicated to summarize ENSR's participation in the subsurface and ground-water characterization activities conducted at the brewery.

The nine USTs (E1-E9) (Registration Number 0161255) were closed by the following methods:

- Tanks E1, E2, E3, and E6: Removal and disposal
- Tanks E4, E5, E7A, E7B, E8, and E9: Closed in place with a cement slurry

The actual age of these tanks are unknown. The age of some of the tanks can be inferred by association with buildings added by Hoffman and Pabst, and from Sanborn map information. The following information is based on an interpretation of the above sources as well as information from tank registration forms and closure observations.

Tanks E1, E2, E3 and E4 contained #6 heating oil and were associated with the boiler in Building 9. The tanks were probably installed in the early 1960s. The original heating oil tanks for Building 9 were located where Building 27 now stands, according to the 1950 Sanborn map. The construction of Building 27 in 1963 would have caused the old tanks to be removed and/or closed with new tanks installed elsewhere.

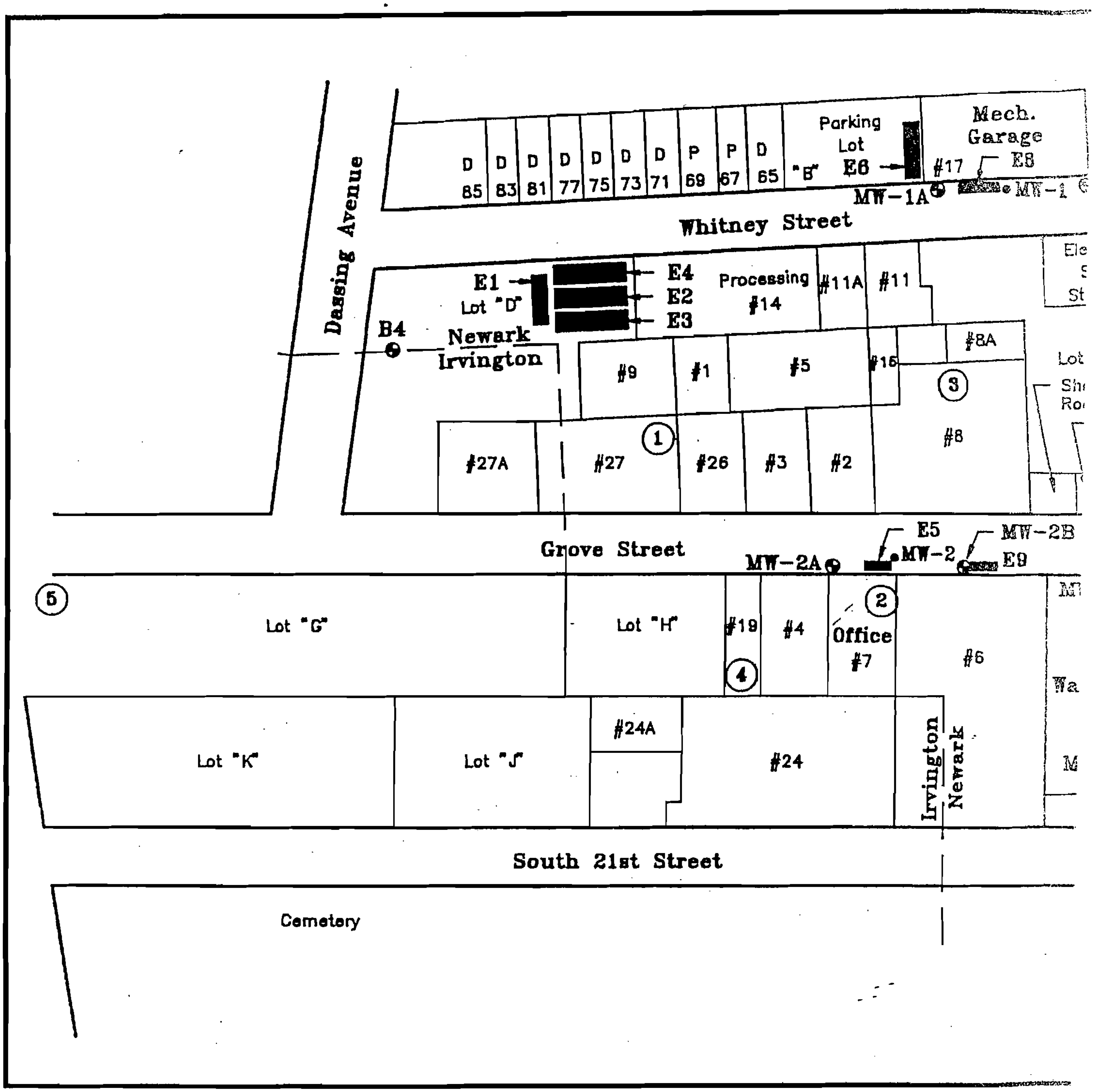
Tank E5, contained #2 diesel fuel which was dispensed from in front of Building 7. Building 7 was built in 1925-26 and a gas tank is listed within the building footprint on the 1926 Sanborn map. The gas tank may be another older UST or could refer to Tank E5.

Tank E6, also contained #2 diesel fuel; this is the only fiberglass tank found on site. According to the 1950 Sanborn map, the lot where the UST was located contained two duplexes. Therefore, Tank E6 was installed after the duplexes were razed, and most likely in the 1970s since fiberglass tanks have only been used within the last 20 years.

Tank E7 is actually two tandem tanks containing leaded gasoline. They can be tentatively dated to the early 1960s, when the adjacent Building 6A was built in 1963.

Figure S

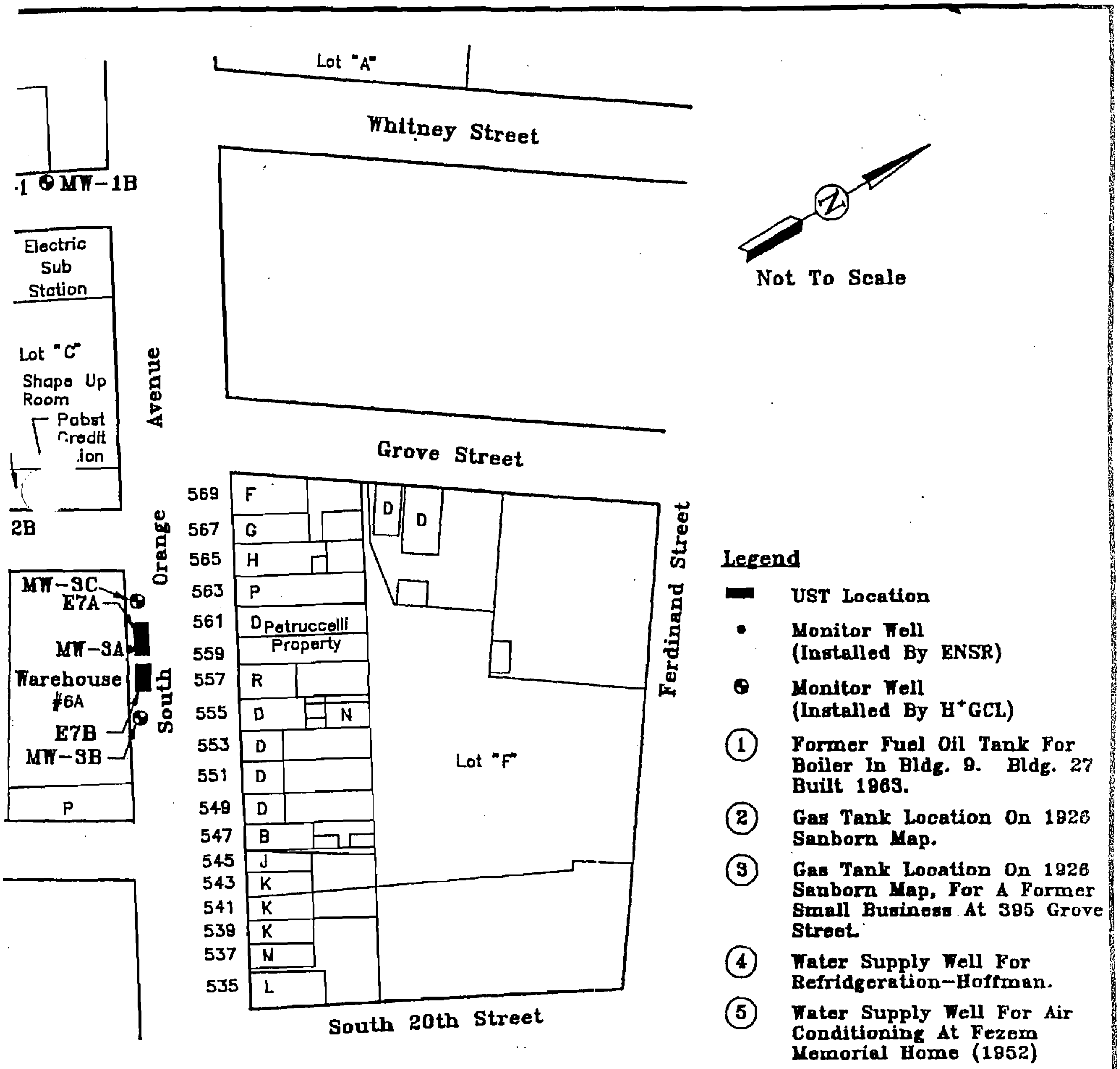
Tank Locati



FNC000274

'e 3-1

:ation Map



4.0 Subsurface Conditions

The subsurface (soil and ground water) conditions at tanks E5, E7, and E8 were evaluated using soil borings and monitor wells installed by ENSR between September 1991 and January 1992 and by H⁺GCL in March 1992. The requirements of a DICAR, as defined by NJ DEP, specify that a minimum of one monitor well be installed within ten feet of the suspect UST, with a minimum of three wells installed on the site to determine ground-water gradient.

4.1 ENSR's Subsurface Investigation

ENSR completed installed fifteen soil borings; three of the soil borings were completed as monitor wells in order to conduct the preliminary subsurface evaluation of the area around the three UST systems. The following information was obtained from ENSR's UST Closure Summary Report dated March 11, 1992.

4.1.1 Soil Investigation

ENSR collected soil samples for laboratory analysis during the soil boring program. Drilling was performed utilizing an air rotary drill rig but ENSR's report does not detail soil sampling procedures. Therefore, sample depths are assumed to be approximate since soil sampling methodologies, such as split spoons or auger cuttings, were not specified in the text. Tables 4-1 through 4-3 summarize ENSR's analytical results from tanks E5, E7, and E8 respectively. Laboratory analytical results are included in Appendix A. The following information describes the results of ENSR's soil sampling program which led to the preparation of this DICAR.

- Tank E5 - Six soil samples were collected from five soil borings with a range of depth between six and twenty-four feet below grade. Figure 4-1 illustrates the sample locations around tank E5. Three of the soil samples were above the NJ DEP action level of 1000 ppm for TPH. A TPH fingerprint analysis was also performed on an unidentified "E5A" sample which indicated that the contents of the 4,000 gallon tank was diesel fuel.

- Tank E7 - Nine soil samples were collected from six soil borings and one unidentified location (Figure 4-2). The samples were collected between four and twenty-three feet below grade. All of the samples analyzed had

Table 4-1

Soil Samples Collected for Tank E5 Closure

ENSR SAMPLE NUMBER	ENVIROTECH NUMBER*	SAMPLING METHOD	DEPTH SAMPLED (ft)	TPH (mg/kg)
E5-MW2-S7	59697	split spoon	13-15	4540
E5-MW2-S10	59698	split spoon	24	408
E5-B2-S3	59700	split spoon	6-8	91
E5-B3-S4	59691	split spoon	8-10	3430
E5-B4-S3	59692	split spoon	7-9	110
E5-B5-S3	59693	split spoon	7-9	7430

* See Appendix A
All depths are approximate
TPH = total petroleum hydrocarbons
TICS = tentatively identified compounds
Method detection limit for TPH is 25 mg/kg

Source: ENSR UST Closure Summary Report
H:\46018\TBL4-1

Table 4-2

Soil Samples Collected for Tank E7 Closure

ENSR SAMPLE NUMBER	ENVIROTECH NUMBER*	SAMPLING METHOD	DEPTH SAMPLED (ft)	VOCs (µg/kg)	TICS (µg/kg)	LEAD (mg/kg)
E7-B1-S2	59703	split spoon	4-6	76840	375110	ND
E7-B1-S3	59699	split spoon	6-8	791000	970000	11
E7-2A-S3	59704	split spoon	6-8	5340	16700	8.2
E7-MW3A-S2	59708	split spoon	8	63640	83940	ND
E7-MW3A-S4	59709	split spoon	23	21050	54870	ND
E7-B3-S4	59706	split spoon	8-10	322300	351600	ND
E7-B4-S3	58710	split spoon	6-8	220900	367100	ND
E7-B5-S3	59707	split spoon	6-8	51370	75000	ND
E7-L1	59701	grab	6-8	6.1	ND	12

* See Appendix A
All depths are approximate
VOCs = total volatile organic compounds
TICS = tentatively identified compounds-sum of 15 reported quantities
Method detection limit for TPH is 25 mg/kg

Source: ENSR UST Closure Summary Report
H:\46018\TBL4-2

Table 4-3

Soil Samples Collected for Tank E8 Closure

ENSR SAMPLE NUMBER	ENVIROTECH NUMBER*	SAMPLING METHOD	DEPTH SAMPLED (ft)	VOCs (µg/kg)	TICS (µg/kg)
E8-B1-S6	59022	split spoon	12-14	287000	1985000
E8-B2-S0	59023	grab	---	ND	ND
E8-B2-S5	59024	split spoon	13-15	199200	998000
E8-B3-S5	59025	split spoon	12-14	743400	3185000

* See Appendix A
All depths are approximate
VOCs = total volatile organic compounds
TICS = tentatively identified compounds-sum of 15 reported quantities

Source: ENSR UST Closure Summary Report
H:\46018\TBL4-3

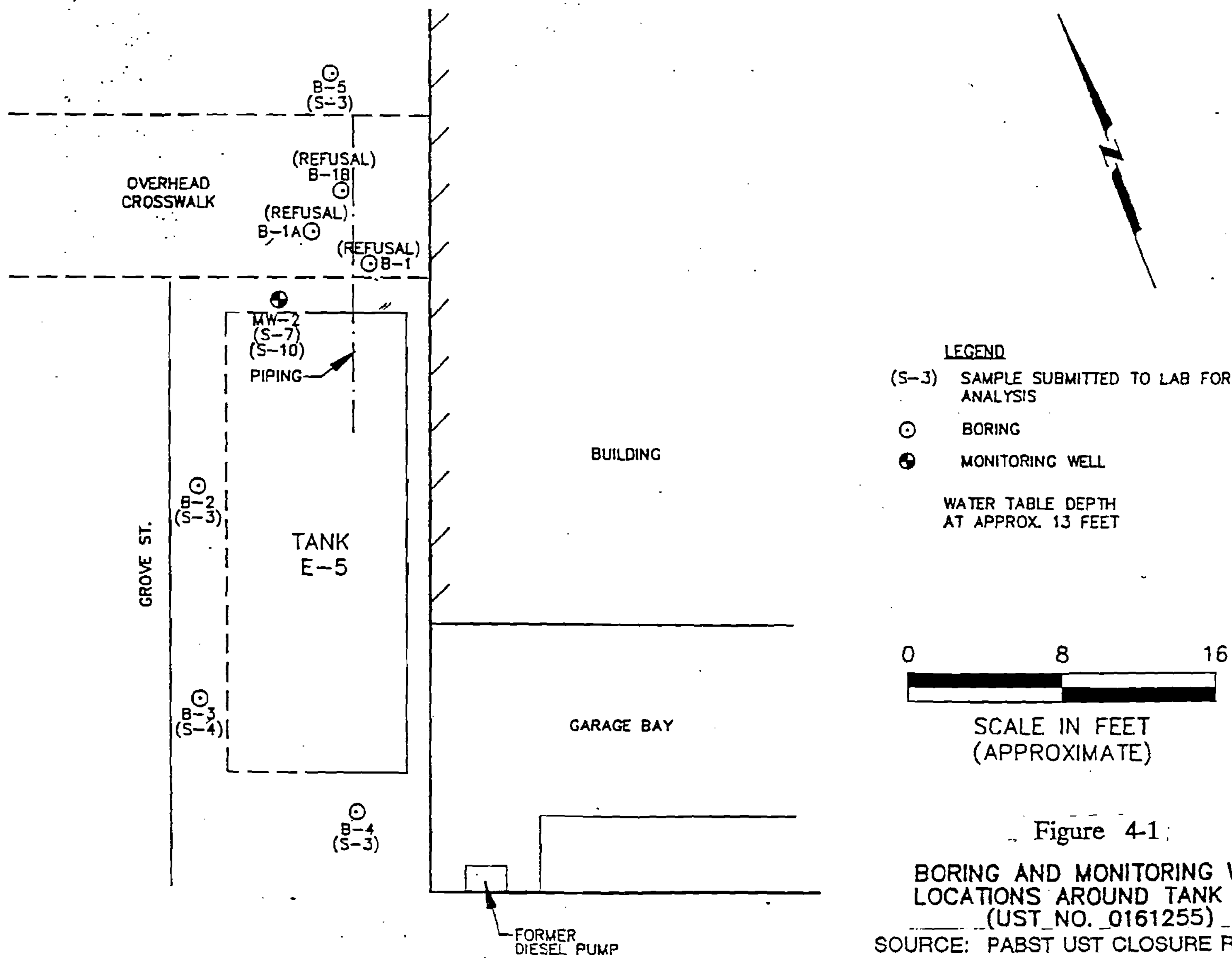


Figure 4-1

BORING AND MONITORING WELL LOCATIONS AROUND TANK E-5 (UST NO. 0161255)

SOURCE: PABST UST CLOSURE REPORT

ENSR

ENSR CONSULTING & ENGINEERING

FNC000280

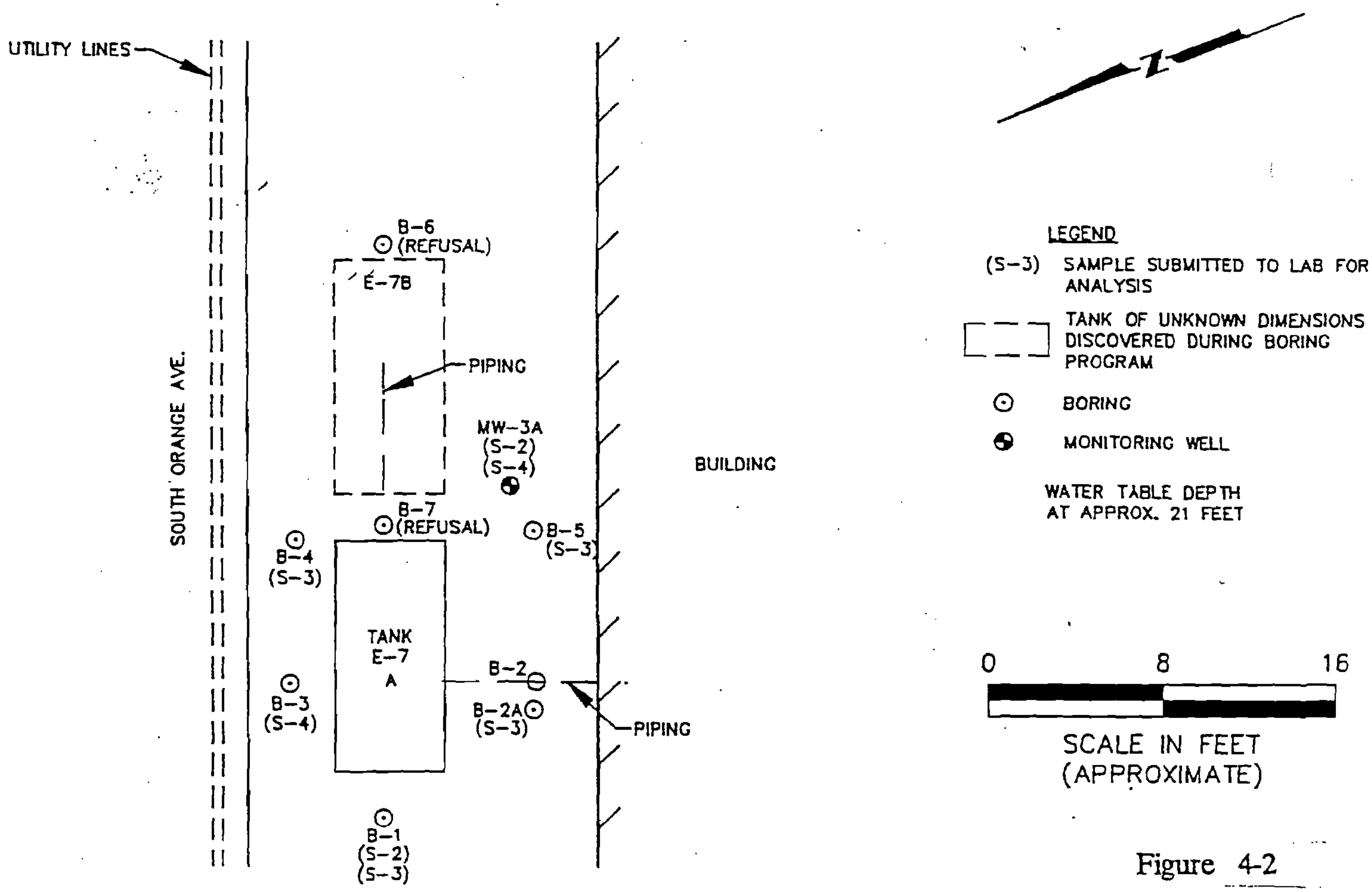


Figure 4-2

BORINGS LOCATED AROUND TANK E7 (UST NO. 0161255)

SOURCE: PABST UST CLOSURE REPORT

ENSR

ENSR CONSULTING & ENGINEERING

reportable quantities (i.e., above detection limits) of VOCs according to NJ DEP regulations. The results ranged between 6.1 and 791,000 µg/kg total VOCs. Three of the samples downgradient of the UST and near the piping also had reported quantities of lead ranging between 8.2 and 12 mg/kg .

- Tank E8 - Four soil samples were collected from three soil borings (Figure 4-3) with a range of depth between twelve and fifteen feet below grade. Three of the samples had reportable quantities of VOCs according to NJ DEP regulations. The total VOC results ranged between 199,200 and 743,400 µg/kg.

4.1.2 Ground-Water Investigation

ENSR installed three ground-water monitor wells at the Pabst facility between October and December 1991. One well was installed for each UST system that was suspected of a petroleum release (Figures 4-1 through 4-3). ENSR sampled ground water at two wells (MW-1 and MW-3A) that were associated with the gasoline tanks. The monitor well associated with tank E5 (MW-2), a diesel tank, was not sampled by ENSR. Table 4-4 presents a summary of ENSR's ground-water sampling results and Appendix A contains the laboratory analytical results.

- Tank E5 - Monitor well MW-2 was installed on December 30, 1992, it was located downgradient of the former diesel tank. This well was not sampled by ENSR for the UST closure report.

- Tank E7 - Monitoring well MW-3A was installed on November 11, 1991, it was located upgradient of tank E7A (the western tank of the tandem E7 system), and downgradient of the E7B tank. The ground water was sampled by ENSR on January 22, 1992 with the following results: total VOCs-15,960 µg/l; benzene toluene, ethylbenzene and xylene (BTEX)-15,960 µg/l; methyl-tertiary-butyl-ether (MTBE)-48 µg/l; and tertiary-butyl-alcohol (TBA) below detection limits of 6200 µg/l.

- Tank E8 - Monitoring well MW-1 was installed on October 24, 1991, downgradient of the former unleaded gasoline tank. The ground water was sampled by ENSR on January 22, 1992 with the following results: total VOCs and BTEX-38,800 µg/l; MTBE-100 µg/l; and TBA-1500 µg/l.

Table 4-4

Ground Water Samples Collected at Tank E7 and E8 Closure

ENSR SAMPLE NUMBER	ENVIROTECH NUMBER*	VOCs (µg/l)	BTEX (µg/l)	TICS (µg/l)	MTBE (µg/l)	TBA (µg/l)
Tank 7 MW-3A	62792	15960	15960	6010	48	ND
Tank 8 MW-1	62791	38800	38800	15200	100	1500

* See Appendix A
VOCs = total volatile organic compounds
TICS = tentatively identified compounds-sum of 15 reported quantities
MTBE = methyl-tertiary-butyl-ether
TBA = tertiary-butyl-alcohol
BTEX = benzene, toluene, ethyl benzene, xylene
ND = non-detectable

Source: ENSR UST Closure Summary Report
H:\46018\TBL4-4

FNC000283

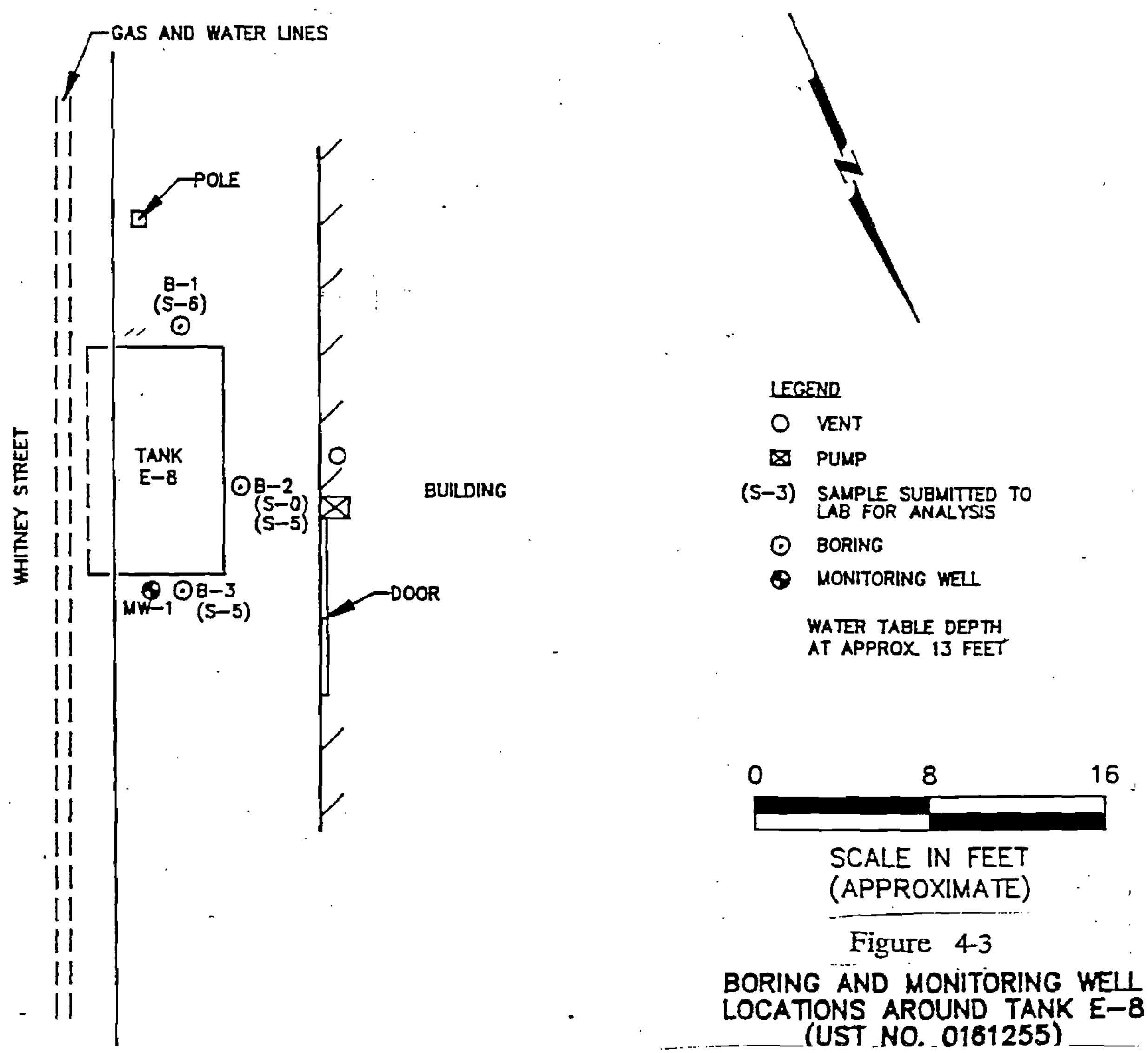


Figure 4-3

BORING AND MONITORING WELL LOCATIONS AROUND TANK E-8 (UST NO. 0161255)

SOURCE: PABST UST CLOSURE REPORT

ENSR CONSULTING & ENGINEERING

FNC000284

4.2 H⁺GCL's Soil Investigation

Between March 2 and 8, 1992 H⁺GCL conducted a limited soil investigation in conjunction with monitor well installation and sampling. Appendix B contains photographs of field activities and of the site conditions. Two soil borings were to be installed in conjunction with each UST system under investigation according to the DICAR protocol, and one soil boring was to be installed upgradient of the three UST sites for use as a background well. These seven borings were to be completed into ground-water monitor wells.

The drilling contractor was Hardin Huber Inc. of Baltimore, Maryland. Drilling was accomplished with a CME-55 hollow stem auger drill rig. Samples were collected using a split spoon sampling device or from the auger cuttings if there were obstructions associated with the UST site. Split spoon samples were collected every five feet to characterize the lithology and to scan the soil for the presence of VOCs with a portable photoionization detector (PID). Appendix C contains H⁺GCL's boring logs.

The sample with the highest PID concentration or the sample nearest to the water table interface when PID concentrations, were not detected, was submitted for analysis. One soil sample was collected from each soil boring and submitted for laboratory analysis of TPH using EPA Method 418.1, and VOCs plus 15 tentatively identified compounds (tics) and xylenes using EPA Method 624. The laboratory contracted to perform the analysis was Northeastern Analytical Corporation (NAC) a New Jersey certified lab. Samples were collected in laboratory prepared containers, and stored on ice until the NAC courier arrived at the site for pick up. Appendix D contains the laboratory analytical results and a summary of the results is presented in Table 4-5.

4.2.1 Tank E5

Two soil borings were installed up and downgradient of ENSR's well MW-2 (Plate 1). Soil boring MW-2A is located on the southern end of the tank field, between tank E5 and the former dispenser. PID concentrations ranged from 0 ppm at five feet to 416 ppm at the fifteen foot interval. The soil sample from the fifteen foot interval was submitted for analysis because it displayed the highest PID reading and it was also located at the water table interface. The resultant TPH concentration of 2906 mg/kg at the 15 foot depth is above the NJ DEP action level of 1000 mg/kg.

Soil boring MW-2B is located north of MW-2, and between tank E5 and tank E9 (Figure 3-1). The only soil sample with a PID reading above background was the thirty foot sample with a concentration of 8 ppm. The sample consisted of three inches of wet shale (no soil) with a petroleum odor. Since soil was not present at this depth the soil sample from the

Table 4-5

Soil Boring Analytical Results

BORING/ WELL	DEPTH IN FT.	UST/CONTENTS	NAC SAMPLE NUMBER	TPH[1]	METHYLENE[2] CHLORIDE	TOLUENE[2]	ETHYL BENZENE[2]	o- and p- XYLENES[2]	m-XYLENES[2]	VOC TICS[2]
MW1A	25	E8 Unleaded Gas	92L-0890-03	20	49	<56	<56	<110	<56	1,846
MW1B	25	E8 Unleaded Gas	92L-0890-05	30	<5	<5	<5	<11	<5	138
MW2A	15-17	E5 Diesel	92L-0890-02	2906	<14,000	6,100	37,000	190,000	51,000	315,000
MW2B	15-17	E5 Diesel	92L-0890-01	16	4	<6	<6	<11	<6	7
MW3B	15-17	E7B Leaded Gas	92L-0852-02	<10	4	<6	<6	<11	<6	100
MW3C	5-7	E7A Leaded Gas	92L-0852-01	<10	6	<6	1	5	2	37
B4	10-12	Background	92L-0852-03	<10	4	<6	<6	<11	<6	18

[1] mg/kg Method 418.1
[2] μg/kg Method 624

Note: This table reflects only analytes that were detected in concentrations above the detection limit in one or more samples.

H:\46018\TBL4-5

water table interface (fifteen feet) was submitted for analysis. The boring was completed to thirty feet below grade. The fifteen foot sample displayed a TPH concentration of 16 mg/kg, which is well below the 1000 mg/kg TPH action level established by the NJ DEP.

4.2.2 Tank E7

Two soil borings were installed up and down gradient of ENSR's well MW-3A (Plate 1). Soil boring MW-3B is located upgradient of tank E7B (of the tandem E7 UST system). This boring was completed to a depth of twenty-five feet below grade. None of the soil samples displayed

PID concentrations above 0 ppm. The sample submitted for laboratory analysis was located at the water table interface from the fifteen foot interval. This soil sample did not exhibit a TPH concentration above the detection limit of 10 mg/kg.

Soil boring MW-3C is located down gradient of tank E7A. This borehole was completed to a depth of twenty feet below grade. The only split spoon sample that displayed a PID concentration above background was the five foot interval at 4.8 ppm. The soil sample from this interval was submitted for laboratory analysis and TPH was not observed above the detection limit.

4.2.3 Tank E8

Two soil borings were installed up and down gradient of ENSR's well MW-1, within the limitation of above-ground and underground utilities, on the sidewalk between the mechanical garage and Whitney Street (Plate 1). Overhead cables (low voltage for street lights, telephone, and cable lines) prevented the drill rig from raising the mast safely. Therefore, these two borings had soil samples collected from the auger cuttings not split spoons. Soil boring MW-1A is upgradient of the former gasoline tank E8. PID concentrations ranged between 0 and 1 ppm for auger cuttings collected from a depth of five to twenty feet below grade. The twenty-five foot interval cuttings had a PID concentration of 121 ppm. The soil from this interval was submitted for laboratory analysis and the TPH concentration was 20 mg/kg, which is well below the 1000 mg/kg NJ DEP action level.

Soil boring MW-1B is downgradient from tank E8 and ENSR's well MW-1. PID readings were recorded only for the auger cuttings from the twenty and twenty-five foot intervals and the concentrations were 2 and 115 ppm, respectively. Soil from the twenty-five foot interval was submitted for analysis; the TPH concentration was 30 mg/kg which is well below the 1000 mg/kg NJ DEP action level.

4.2.4 Lot D

One soil boring was installed in Lot D to determine the background soil concentration for the area. The soil boring, B4, was to be completed into a monitor well but no ground water was encountered before auger refusal was reached at 33 feet. A second soil boring (B4A) was then attempted but again no ground water was observed before auger refusal was encountered; therefore, the background monitor well was not installed. Background soil was characterized for the first boring (B4) only. Borehole B4A was drilled approximately twenty-five north of B4. Boring B4 reached auger refusal at thirty-three feet, and B4A had auger refusal at thirty-two feet below grade. The only soil sample with a PID reading above background was the ten foot sample interval at 1.0 ppm. This sample was submitted for laboratory analysis and the TPH concentration was not above the detection limit.

4.3 H^+GCL's Ground-Water Investigation

The six soil borings that encountered ground water were completed into four-inch diameter polyvinyl chloride (PVC) monitor wells with 0.020 inch slot screen. Monitor well completion diagrams are located in Appendix D. The monitor wells were installed according to the specifications outlined in the DICAR requirements as published by the NJ DEP Division of Water Resources, Bureau of Underground Storage Tanks, September 1989.

Prior to and during monitor well development activities, the physical and chemical characteristics of the ground water were recorded. The water was monitored for pH, specific conductivity, temperature, turbidity, odor, and sheen. Well development records are located in Appendix D.

The monitor wells were not allowed to remain undisturbed for a minimum of two weeks after development, as specified by the DICAR requirements. Well sampling was conducted after installation and development to allow for a quick turnaround of laboratory analyses so that the NJ DEP submission deadline of March 27, 1992 for the DICAR could be met. Water samples were collected at each of the six wells installed by H^+GCL and one of the wells, MW-2, installed by ENSR.

Each well had sufficient water collected to perform the following laboratory analysis; TPH fingerprint (Method 8015), VOCs plus 15 tics and xylenes (Method 625), and semi-volatiles plus 15 tics (Method 624). The laboratory contracted to perform the analysis was

Northeastern Analytical Corporation (NAC), a New Jersey certified lab. Samples were collected in laboratory prepared containers, and stored on ice until the NAC courier arrived at the site for pick up. A summary of the ground-water sampling results from March 1992 are included on Table 4-6. The laboratory analytical results are included in Appendix E.

Ground-water elevations were measured prior to collection of the water samples. As shown on Plate 1, the ground-water flow direction at the site is towards the north-northwest, with a hydraulic gradient of 0.002. A minor variation in the ground-water elevations is observed at tank E5. Well MW-2 has a ground-water elevation approximately 1 foot higher than the neighboring wells. This anomaly may be related to the presence of an underground tunnel located immediately downgradient of MW-2. The tunnel extends from five to 15 feet below ground surface, and may act as a partial barrier to ground-water flow in this area.

4.3.1 Tank E5

Monitor wells MW-2, MW-2A and MW-2B were sampled on March 7, 1992. The sampling plan included MW-2 installed by ENSR.

MW-2 is the only well sampled that met the DICAR requirement of being installed and allowed to be undisturbed for a minimum of two weeks prior to sample collection. Monitor well MW-2, which is located immediately adjacent to the tank, had the highest TPH concentration of the three wells sampled around tank E5. This tank was identified as a diesel fuel tank by ENSR. MW-2 displayed a diesel fuel concentration of 6,800 $\mu g/l$. The VOC analysis revealed a BTEX concentration of 262 $\mu g/l$. MTBE and TBA were not detected above laboratory quantitation limits.

MW-2A was installed up-gradient of the tank and near the former fuel dispenser. The well was located close to the piping connecting the dispenser and the tank. The TPH sample was reported to contain 2,000 $\mu g/l$ of unleaded gasoline, not diesel fuel as reported for MW-2. The BTEX concentration was 4,043 $\mu g/l$, with MTBE and TBA results below the limits of reliable quantitation.

MW-2B was installed downgradient from the tank and on the downgradient side of the underground tunnel. TPH results were 2,200 $\mu g/l$ for unleaded gasoline which is consistent with the MW-2A results, collected approximately sixty-seven feet upgradient from MW-2B. BTEX concentrations were only 407 $\mu g/l$, and MTBE and TBA were both below limits of reliable quantitation.

Table 4-

Groundwater Laboratory Results from March 1992 Sampling

Monitor Well	NAC Sample Number	TPH[1] Fingerprint	BTEX[1]	MTBE[1]	TBA[1]	Naphthalene[1]	Flourene[1]	Phenanthrene[1]	Bis (2-ethylhexyl) phthalate[1]	Acenaphthene[1]	Lead[2] ppm	VOC TICS[1]	Semi-VOC TICS[2] ppm
MW-1A	92L-0910-14		957	<10	6 J							831 J	
	92L-0910-15		618	<10	<50							711 J	
	92L-0910-16	1900 gas											
	92L-0910-17	1100 gas											
	92L-0910-18					2 J	<10	<10	<10	<10			731 J
MW-1B	92L-0910-19		52	<10	<50							244 J	
	92L-0910-20	310 gas											
	92L-0910-21					<10	<10	<10	<10	<10			144 J
MW-2	92L-0910-04		262	<10	17 J							270 J	
	92L-0910-05	6800 diesel											
	92L-0910-06					<30	10 J	7 J	30	<30			1356 J
MW-2A	92L-0910-01R		4043	<200	450 J							1670 J	
	92L-0910-02	2000 gas											
	92L-0910-03					110	8 J	5 J	<10	3 J			1598 J
MW-2B	92L-0910-07		407	<10	<50							653 J	
	92L-0910-08	2200 gas											
	92L-0910-09					<10	5 J	4 J	<10	<10			949 J
MW-3B	92L-0910-22		3 J	2 J	5 J							23 J	
	92L-0910-23	690 diesel											
	92L-0910-24					<10	<10	1 J	<10	<10			152 J
	92L-0910-25										0.037		
MW-3C	92L-0910-10		12 J	10	12							6 J	
	92L-0910-11	<50											
	92L-0910-12					<10	<10	<10	<10	<10			96 J
	92L-0910-13										0.063		

J = below limits of reliable quantitation
1 = µg/l
2 = mg/l
TPH = total petroleum hydrocarbons
BTEX = benzene, toluene, ethylbenzene, xylene
MTBE = methyl-tertiary-butyl ether
TBA = tertiary-butyl alcohol
VOC = volatile organic compounds
TICS = tentatively identified compounds-sum of 15 reported quantities
Semi VOC = semi-volatile organic compounds

Note: This table reflects only analytes that were detected in concentrations above the detection limit in one or more samples.

4.3.2 Tank E7

Monitor well MW-3B was sampled on March 7 and well MW-3C was sampled on March 8, 1992. Well MW-3C is located downgradient from tanks E7A and E7B. The laboratory results did not indicate the presence of TPH above the 50 μg/l detection limit. The VOCs and semi-volatile results showed low concentrations of MTBE (10 μg/1) and TBA (12 μg/1) and the remaining analytes were below the laboratory detection limits. The tank system of E7A and E7B formerly contained leaded gasoline, therefore a sample for total lead was also analyzed. The lead results were 0.063 mg/l.

Well MW-3B is located upgradient from tank E7B, and this well is most upgradient well installed on the site. TPH results from this well were reported to be 690 μg/l of diesel fuel. The TPH analysis is based the chemist's interpretation of the chromatograph peaks and therefore may not be 100% accurate as to the specific type of petroleum product detected. The sample for total lead analysis had a result of 0.037 mg/l

4.3.3 Tank E8

Monitor wells MW1-A and MW-1B were sampled on March 8, 1992. Well MW-1A is located upgradient from tank E8, a former unleaded gasoline tank. TPH results indicate a presence of unleaded gasoline in concentrations of 1,900 μg/l in the first sample and 1,100 μg/l in the duplicate sample that was collected for quality assurance. The BTEX concentrations were 957 and 618 μg/l, respectively. MTBE and TBA were not detected above quantitative levels.

Well MW-1B is located downgradient of tank E8. The TPH results for MW-1B, 310 μg/l of unleaded gasoline, were lower than the TPH results for MW-1A. The BTEX concentration was also considerably lower at 52 μg/l. No MTBE or TBA were detected above quantitation levels.

5.0 Evaluation and Recommendations for Corrective Action

5.1 Evaluation of Analytical Results

There are significant variations between the analytical data obtained by ENSR during closure activities and the data collected by H⁺GCL during the DICAR site assessment. H⁺GCL cannot verify the accuracy of the data obtained by ENSR. These variations may be due to differences in sampling protocol, laboratory methodologies or variations in contaminant concentration in the areas under investigation. ENSR data has been used in the interpretation and evaluation of the subsurface contamination only around tank E5 since their data at this site was comparable to H⁺GCL's data.

5.1.1 Tank E5 Area

Figure 5-1 presents a TPH concentration map for soil and ground water at tank E5. As is shown on the figure, TPH contamination in the soil is present at elevated concentrations (4540 mg/kg) at ENSR's well MW-2; the samples collected by H⁺GCL from MW-2A and MW-2B, at the same sample interval, had significantly lower concentrations of TPH - 2906 and 30 mg/kg, respectively. It is unknown if vadose zone contamination extends under the building.

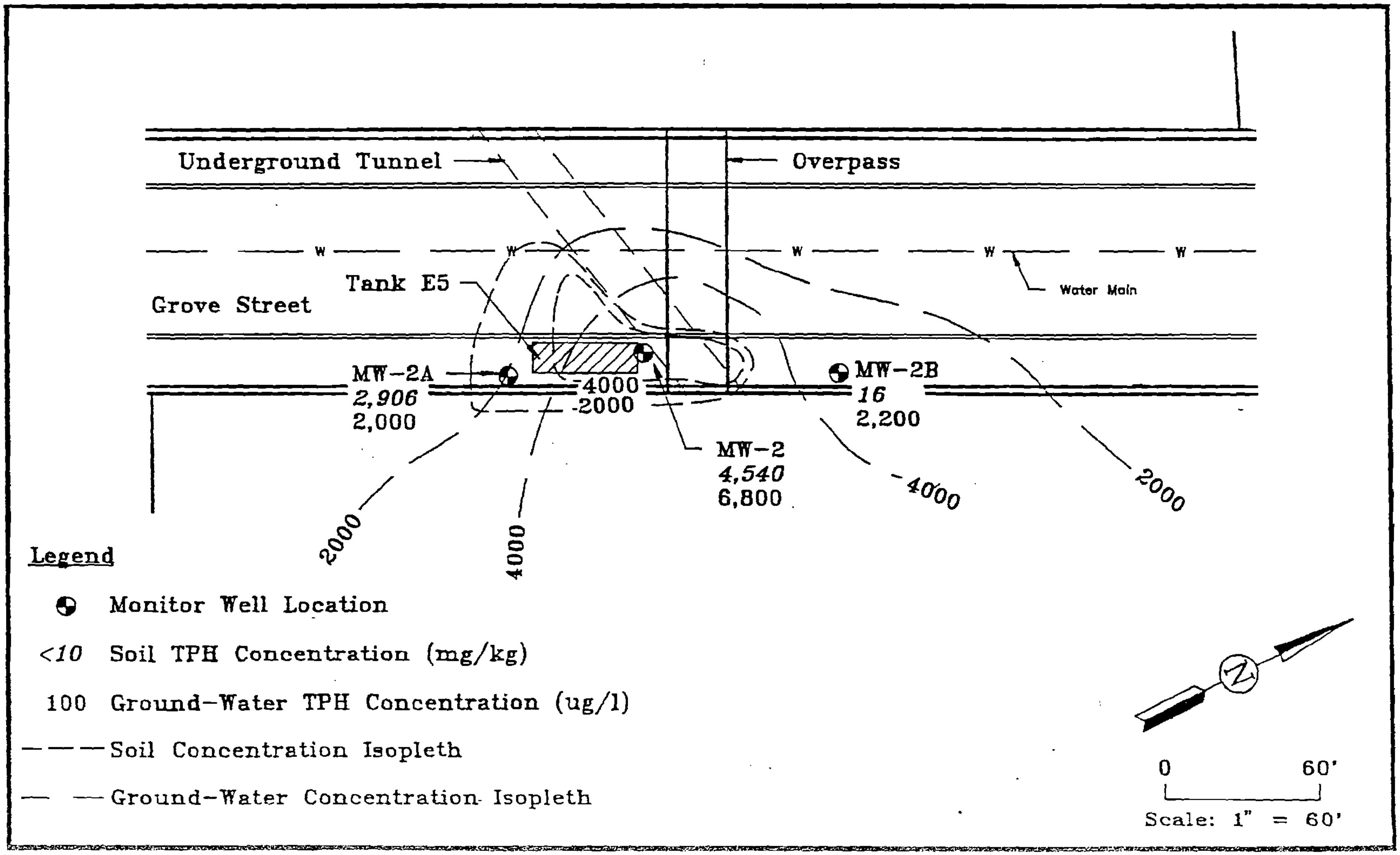
The ground-water sampling results were all obtained during the March 1992 sampling event, as ENSR did not sample MW-2 during closure operations. Well MW-2 had a significantly higher TPH concentration, 6800 μg/l, than the results obtained from wells MW-2A (2000 μg/l) and MW-2B (2200 μg/l). However, the BTEX results from MW-2A are higher (4043 μg/l) than the results from MW-2 and MW-2B at 262 and 407 μg/l, respectively.

The tank was closed in place and soil was not removed during closure activities, therefore the source has not been removed. In addition, well MW-2 was installed immediately adjacent to the tank between the tank and the underground tunnel. Therefore, the high concentrations exhibited by MW-2 may be the result of the proximity of the well to the tank and the confining underground structures. The presence of the underground tunnel near tank E5 may act as a partial barrier to ground water and contaminant migration, which would provide an explanation for the high concentrations of TPH in the soil and ground water at MW-2A and MW-2; the absence of TPH contamination in the soil at MW-2B; and the anomalous water level elevation at MW-2.

There is also the possibility of the presence of an additional tank located within the Building 7 footprint. This tank was listed on the 1926 Sanborn map as a gasoline tank.

Figure 5-1

TPH Concentration Map, Tank E5
March 20, 1992



FNC000293

This tank could be a previously unidentified potential source of gasoline contamination observed in wells MW-2A and MW-2B.

5.1.2 Tank E7 Area

The TPH concentration map for tank E7 is presented on Figure 5-2. This figure only includes a TPH isopleth for ground water since H⁺GCL's soil results were below detection limits. Based on the results of our sampling, the soil contamination in this area is minimal. The samples collected by ENSR were analyzed for VOCs however, ENSR did not collect samples for TPH analysis. The VOC concentrations in soil recorded by ENSR are significantly higher than the sample results obtained by H⁺GCL (791,000 μg/kg versus 14 μg/kg for the two samples with the highest concentration from each sampling event).

Well MW-3B exhibited a TPH concentration of 690 μg/l and the TPH concentration for MW-3C was below the detection limit. The TPH fingerprint for MW-3B was identified as fuel oil, however this tank was reported to have contained leaded gasoline; further MW-3B is upgradient of the tank. The fuel oil identified by the laboratory may be from an off-site source. The TPH fingerprint analysis may not be 100% accurate as to the specific type of petroleum product identified because it is based the chemist's interpretation of the chromatograph peaks. Since this tank was reported to have contained leaded gasoline the ground water was also sampled for total lead. The analytical results for lead were low at 0.037 mg/l for MW-3B and 0.063 mg/l for MW-3C, these concentrations are just over the drinking water maximum contaminant level of 0.05 mg/l; however, ground water in this area is not used as a drinking water source.

5.1.3 Tank E8 Area

The TPH concentration map for tank E8 is presented as Figure 5-3. As shown on the figure the soil contamination in this area is limited in extent and is only present in low concentrations. The TPH results for soil samples collected from MW-1A and MW-1B are 20 and 30 mg/kg, respectively. ENSR did not collect soil samples for TPH analysis. The VOC concentrations for these two wells were all below detection limits with the exception of methylene chloride at 49 μg/kg. ENSR collected soil samples during tank closure activities for VOC analysis. Their results are again significantly higher than the VOC results obtained by H⁺GCL.

Ground-water contamination in this area is present at low concentrations. The TPH concentration map is presented on Figure 5-3, the TPH concentration at MW-1A is 1,900

Figure 5-2

TPH Concentration Map, Tanks E7A & E7B
March 20, 1992

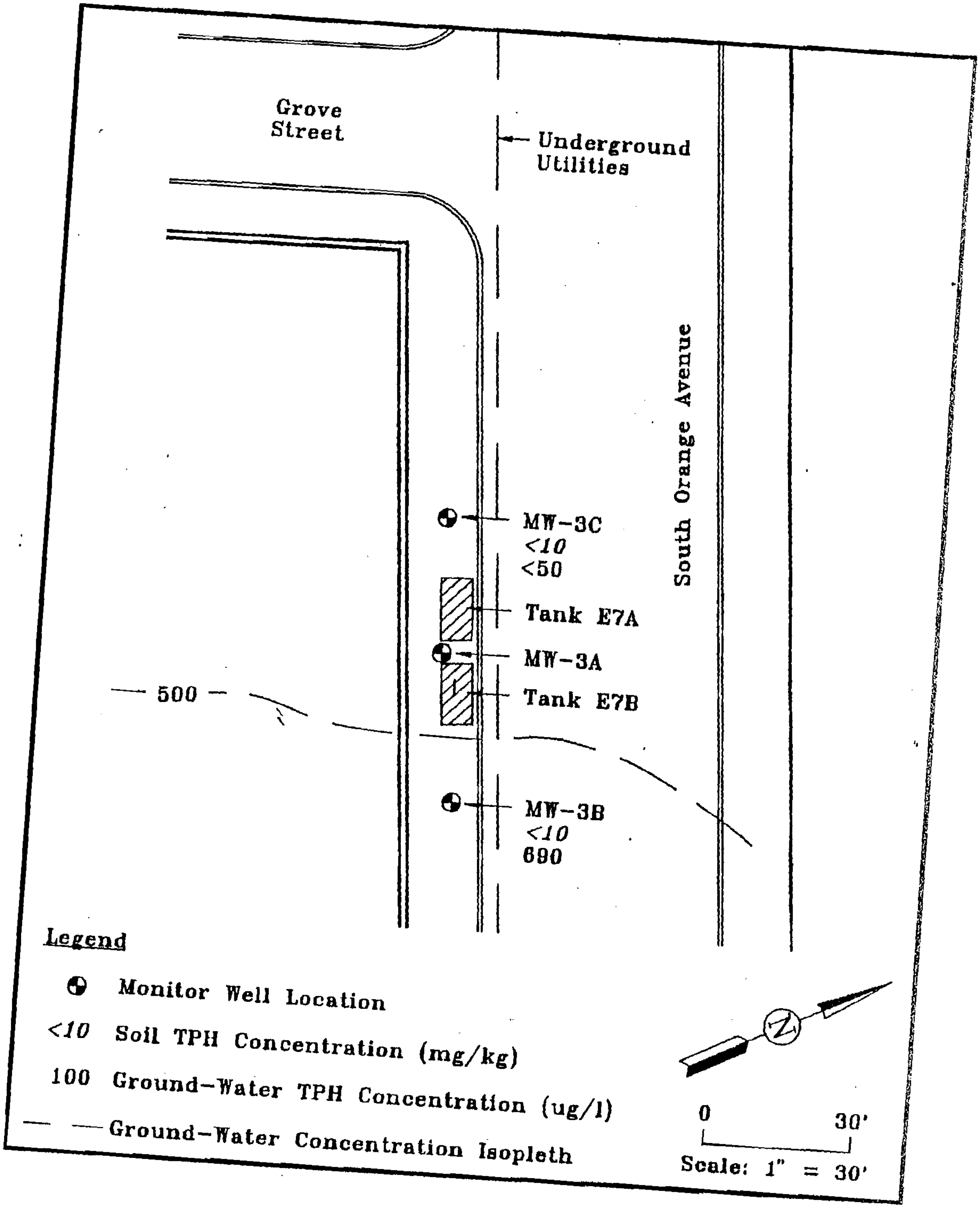
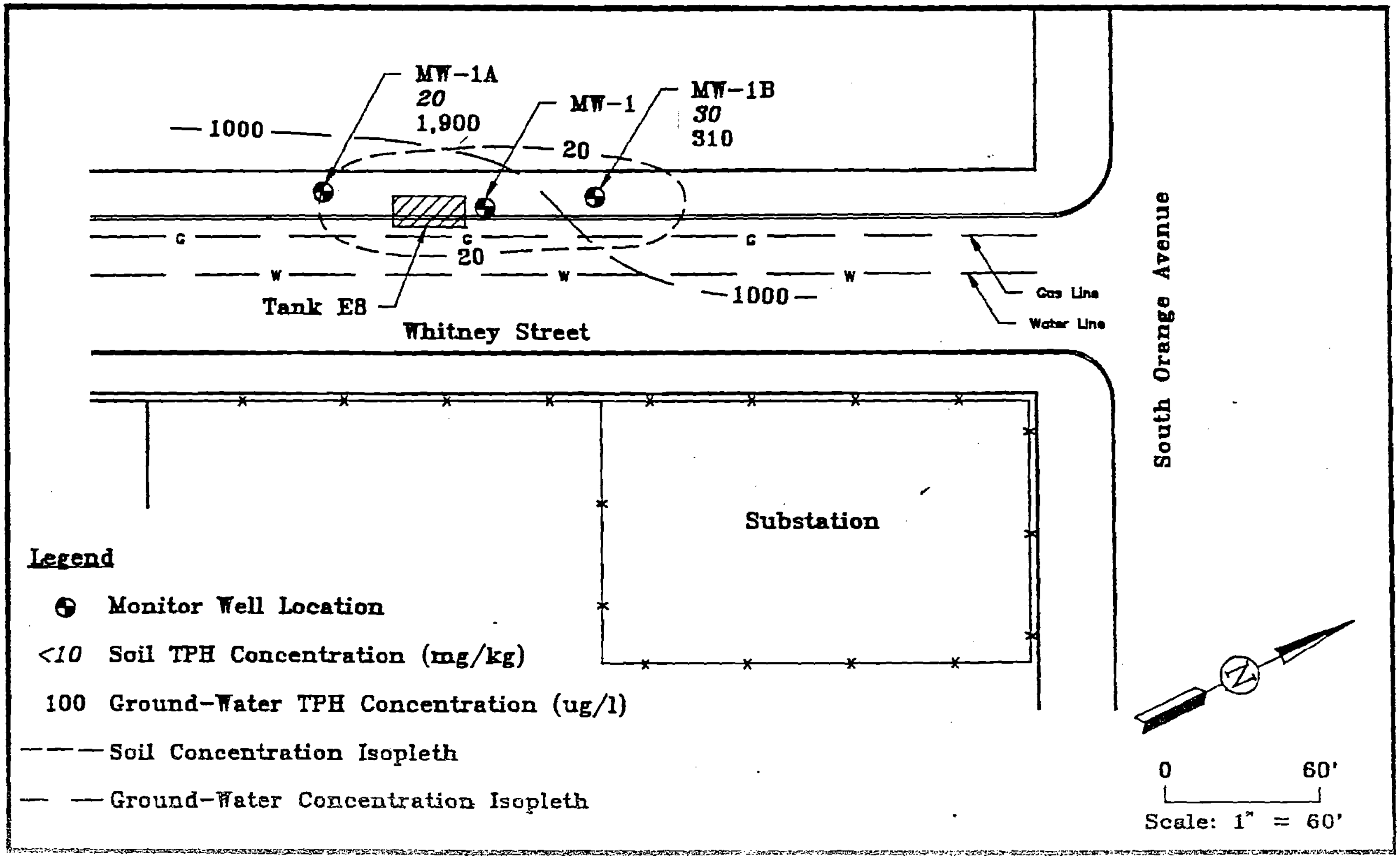


Figure 5-3

TPH Concentration Map, Tank E8
March 20, 1992



FNC000296

μg/l and at MW-1B 310 μg/l. The VOC concentrations from H⁺GCL's sampling are all below the reliable limits of quantitation with the exception of BTEX at 957 and 52 μg/l for MW-1A and MW-1B respectively. The VOC results from MW-1 collected by ENSR are much higher than the VOC concentrations in the other wells, which may be the result of the location of the MW-1 to the tank. It is reported that this well is located immediately adjacent to the tank.

5.2 Recommendations

Based on the analysis of potential receptors, there is no immediate threat to ground or surface water in the vicinity of the site.

5.2.1 Tank E5

Soil and ground-water contamination is present in the vicinity of Tank E5. TPH concentrations in the soil exceed NJ DEP's action level of 1000 ppm to a minimum depth of 17 feet below ground surface. Ground-water contamination, as represented by TPH concentration, ranges from 6800 μg/l to 2000 μg/l. H⁺GCL recommends that the soil in this area be excavated to the extent possible during future site renovations to eliminate and/or mitigate the source of contamination.

5.2.2 Tank E7

Soil samples results from the Tank E7 were below the TPH detection limit and the VOC concentrations are low (BTEX at 8 μg/kg). Ground-water sample results for Tank E7 are also low for VOC's (below detection limits or below reliable limits of quantitation). One TPH sample detected diesel fuel oil at a low concentration, below the NJ DEP Action level, however the tanks in question were reported to have contained leaded gasoline and the TPH fingerprint does not correlate to the suspect source. Other than re-sampling the ground-water monitor wells to verify the low concentrations of petroleum-based hydrocarbons, H⁺GCL recommends no further action at this time.

5.2.3 Tank E8

The TPH concentrations in the soil near tank E8 are below the NJ DEP's action levels of 1000 mg/kg. The TPH concentration in ground water (1900 and 310 mμ/l) and the VOC concentration in both soil (below detection limits for BTEX) and ground water (957 and 52 μg/l) are low. Therefore, H⁺GCL recommends that no remedial action be conducted at this location.

5.2.4 Resample Ground-Water Monitor Wells

Due to time constraints between the installation of ground-water monitor wells and the submission deadline for the DICAR, the ground-water monitor wells were sampled prior to the required two week waiting time. The wells were drilled using a hollow stem auger rig and no fluids were introduced during drilling activities. However, the ground-water sample results provided by ENSR are significantly higher than the samples results obtained two months later. Therefore, H⁺GCL recommends that all nine wells installed in conjunction with tank closure and site assessment activities be resampled to verify the discrepancies between the two sets of laboratory data. H⁺GCL may modify these recommendations based on the results of the re-sampling.

5.2.5 Investigate Potential Presence of Explosive Vapors in Tunnel near Tank E5.

H⁺GCL also recommends that a survey be conducted to determine if a potential explosive vapor hazard exists within the underground tunnel and adjacent basement areas located near tank E5, due to the presence of elevated levels of TPH around the tank.

ATTACHMENT 10

Central File

PABST BREWING COMPANY
400 GROVE STREET, NEWARK, NEW JERSEY 07106 (201) 373-6000

June 10, 1983

[redacted]
Industrial Pretreatment Section
Water Quality Management Element
NJDEP Division of Water Resources
P.O. Box CN 029
Trenton, New Jersey 08625

RECEIVED
JUN 14 1983
State of New Jersey
Dept. Environmental Protection
Division Water Resources

Re: NJPDES/SIU Permit No. NJ0028088

Dear Ms. Aiello:

Attached is the list you requested showing the dates our pH exceeded 10.5. In addition to this, you requested the name of the laboratory we use for our analysis. We collect a 24 hour composite sample and use our in-house laboratory to run all tests.

If you need additional information please let me know. Thank you for your assistance in helping me properly report this data.

Yours Truly,

Michael Engleman
Plant Engineer

MR:lr
Enc.

PABST BREWING COMPANY

Period from February 1, 1983 to April 30, 1983

pH levels above 10.5

FEBRUARY:

2/1	11.82
2/7	11.40
2/14	11.17
2/22	11.03

MARCH:

3/7	11.11
3/28	10.58

APRIL:

4/4	11.09
4/5	10.67
4/18	10.65
4/19	11.37
4/25	11.13

ME:lr
6/10/83

PABST BREWING COMPANY

Period from May 1, 1983 to June 10, 1983

pH levels above 10.5

MAY:

5/2	11.21
5/3	10.70
5/4	11.17

JUNE:

6/1	11.36

ME:lr
6/10/83

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION II
26 Federal Plaza
New York, New York 10278

FACT SHEET
FOR DRAFT NPDES PERMIT TO DISCHARGE
INTO THE WATERS OF THE UNITED STATES

No. NPDES Application No. NJ0028088 Date:

Name and Address of Applicant
Pabst Brewing Company
917 West Juneau Avenue
Milwaukee, Wisconsin 53201

Name and Address of Facility where
Discharge Occurs
Pabst Brewing Comapny
400 Grove Street
Newark, New Jersey

Receiving Water:
Maybaum Creek

Classification:
FW-2 Nontrout

I. LOCATION OF DISCHARGE

The above named applicant has applied for a National Pollutant Discharge Elimination System (NPDES) permit, to the U.S. Environmental Protection Agency (EPA) to discharge into the designated receiving water.

II. DESCRIPTION OF FACILITY

A brief description of the type of facility or activity which is the subject of the draft permit is provided in the Public Notice of preparation of this draft permit.

III. DESCRIPTION OF DISCHARGE

A description of the type and quantity of pollutants which are discharged or proposed to be discharged are appended as Attachment I.

IV. DESCRIPTION OF DRAFT PERMIT CONDITIONS

The effluent limitations, monitoring requirements, schedules of compliance and other conditions of the draft permit are described in Attachment II. Also included in Attachment III is a brief summary of the basis for each effluent limitation and other conditions in the draft permit.

V. STATE CERTIFICATION REQUIREMENTS

State Certification requirements are described in Attachment III. Review and appeals of limitations and conditions attributable to State Certification shall be made through the applicable procedures of the State and may not be through EPA procedures. [40 CFR 124.55(e)]

VI. VARIANCE OR MODIFICATION (if applicable)

N/A

[40 CFR 124.8(b) (5)]

VII PROCEDURES FOR REACHING A FINAL DECISION ON THE DRAFT PERMIT

These procedures, which are set forth in 40 CFR 124, are described in the public notice of preparation of this draft permit. Included in the public notice are requirements for the submission of comments by a specified date, procedures for requesting a hearing and the nature of the hearing, and other procedures for participation in the final agency decision. [40 CFR 124.8(b) (6)]

VIII. EPA CONTACT

Additional information concerning the draft Permit may be obtained between the hours of 8:00 A.M. and 4:30 P.M., Monday through Friday from: [40 CFR 124.8(b) (7)]

ATTACHMENT I

Date Prepared:
Date Revised :

PERMIT SUMMARY TABLE

Company: Pabst Brewing Company
Location: 400 Grove St., Newark
Receiving Waters: Maybaum Creek
MA7CD/10:
Direct Discharges: (1)

	Flow (MGD) Avg.	Max.	Disch. #'s
non-contact cooling	0.158		001

Lat:
Long:
Exist. Class: FW-2 Nontrout
EPA Permit E/S:
Thermal:
W.Q. Analysis:
State Engr/Sci: K. Jones

Total Parameter	DATA Application	Files	Existing Permit Conditions	Proposed Effluent Limits	Draft Permit Requirements Monitoring Schedule	Sample Type
Thermal						
Disch. No.	001	001	001	001	001	001
Avg. Δ T °F	N/A	N/A	N/A	N/A	N/A	N/A
Max. T °F	not available	32°C	32.2°C(90°F)	32.2°C(90°F	monthly	grab
Max. Flow (MGD)	0.158 Avg.	.340	N/A	N/A	monthly	composite
General Parameters						
PH Range	not given	6.4 to 7.05	6.0 to 9.0	6.0-9.0	monthly	grab
Total Suspended Solids	131 mg/l	2.9 kg/day	9 kg/day (20 lbs/day)	9 kg/day (20 lbs/day)	monthly	composite
Chromium*	N/A	N/A	1.0 mg/l	0.5 mg/l	monthly	composite
Zinc*	N/A	N/A	1.0 mg/l	1.0 mg/l	monthly	composite
Oil & Grease	N/A	N/A	N/A	N/A	N/A	N/A
Oxygen Demanding & Nutrients						
TVS	N/A	N/A	N/A	N/A	N/A	N/A
BOD_5	3.3 mg/l	N/A	N/A	N/A	N/A	N/A
COD	68 mg/l	6.0 kg/day	12.3 kg/day (27 lbs/day)	12.3 kg/day (27 lbs/day)	monthly	composite
TOC	N/A	N/A	N/A	N/A	N/A	N/A

*monitoring is not required unless the value of the parameter is increased as a result of water treatment.

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning EDP and lasting through EDP + 5 years
the permittee is authorized to discharge from outfall(s) serial number(s) 001.

Such discharges shall be limited and monitored by the permittee as specified below:

ffluent Characteristic	Discharge Limitations				Monitoring Requirement	
	kgs/day(lbs/day)		other units(specified)			
	Avg.Monthly	Max.Daily	Avg.Monthly	Max.Daily	Measurement Frequency	Sampl Type
low-m^3/Day (MGD)	N/A	N/A	N/A	N/A	monthly	composi
emperature °C(°F)	N/A	N/A	N/A	32.2(90)	monthly	grab
otal Suspended Solids	N/A	9(20)	N/A	N/A	monthly	composi
hromium*	N/A	N/A	N/A	0.5 mg/l	monthly	composi
inc*	N/A	N/A	N/A	1.0 mg/l	monthly	composi
OD	N/A	12.3(27)	N/A	N/A	monthly	composi

he pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and
hall be monitored monthly by a grab sample.

here shall be no discharge of floating solids or visible foam in other than trace amounts.

amples taken in compliance with the monitoring requirements specified above shall be taken at the
ollowing location(s): at the outfall of discharge 001.

Monitoring of this parameter is not required unless the value of the parameter is increased as a
result of water treatment.

ATTACHMENT II

Statement of Basis

Pabst Brewing Company
City of Newark, New Jersey
NJ0028088

Pabst Brewing Company located on Grove Street in Newark, New Jersey is involved in the production of malt beverages. Non-contact cooling water is discharged to Maybaum Creek classified as FW-2 Nontrout waters at an average rate of 158,000 gallons per day through outfall 001.

The effluent limitations on Temperature, pH, Total Suspended Solids, Zinc and COD are the same as those in Pabst Brewing Company's current NPDES permit. The effluent limitation on Chromium is based on EPA's current guidelines for non-contact cooling water discharges.

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION

NOTICE OF AUTHORIZATION

Let's protect our earth

PERMIT NO.	ISSUANCE DATE	EFFECTIVE DATE	EXPIRATION DATE
NJ 0028088	11-30-82	2-1-83	10-29-86

ISSUED TO
Pabst Brewing Company
400 Grove Street
Newark, New Jersey 07106

FOR ACTIVITY/FACILITY AT
Same as applicant

OWNER
Pabst Brewing Company
917 West Juneau Avenue
Milwaukee, Wisconsin 53201

ISSUING DIVISION
- [X] Water Resources
- [ ] Coastal Resources
- [ ] Environmental Quality

TYPE OF PERMIT
N.J. Pollutant Discharge Elimination System (NJPDES) Permit SIU Indirect Discharge

STATUTE(S)
N.J.S.A. 58:10A-1 et seq.

APPLICATION NO.
N/A

A PERMIT TO

Discharge the wastewater generated at Pabst Brewing Company, Newark, in the preparation of malt beverages into the Passaic Valley Sewerage Commissioners treatment plant in conformance with the effluent limits and monitoring requirements as stated in Part III Table I and subject to additional conditions and other requirements in Parts II and III.

DEP AUTHORIZATION

Form DEP-008
7/80

THIS NOTICE MUST BE CONSPICUOUSLY DISPLAYED AT THE ACTIVITY/FACILITY SITE.

LPRSA0042734

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
CN 402
Trenton, N. J. 08625

Let's protect our earth

PERMIT *

The New Jersey Department of Environmental Protection grants this permit in accordance with your application, attachments accompanying same application, and applicable laws and regulations. This permit is also subject to the further conditions and stipulations enumerated in the supporting documents which are agreed to by the permittee upon acceptance of the permit.

Permit No.	Issuance Date	Effective Date	Expiration Date
NJ 0028088	11-30-82	2-1-83	10-29-86

Name and Address of Applicant	Location of Activity/Facility	Name and Address of Owner
Pabst Brewing Company 400 Grove Street Newark, New Jersey 07106	Same as applicant	Pabst Brewing Company 917 West Juneau Avenue Milwaukee, Wisconsin 53201

Issuing Division	Type of Permit	Statute(s)	Application No.
☒ Water Resources ☐ Coastal Resources ☐ Environmental Quality ☐ Other	N.J. Pollutant Discharge Elimination System (NJPDES) permit SIU Indirect Discharge	N.J.S.A. 58:10A-1 *et seq.*	N/A

This permit grants permission to:

Discharge the wastewater generated at Pabst Brewing Company, Newark, in the preparation of malt beverages into the Passaic Valley Sewerage Commissioners treatment plant in conformance with the effluent limits and monitoring requirements as stated in Part III Table I and subject to additional conditions and other requirements in Parts II and III.

Approved by the Department of Environmental Protection

Arnold Schiffman
Administrator
Water Quality Management

11/30/82
DATE

The word permit means "approval, certification, registration, etc."

(GENERAL CONDITIONS ARE ON THE REVERSE SIDE)

Form DEP-007
1/82

LPRSA0042735

Central File

New Jersey Department of Environmental Protection
Division of Water Resources
Permits Administration
CN-029
Trenton, N.J. 08625
(609) 292-5262

PUBLIC NOTICE

SEP 15 1982

NOTICE: ISSUANCE OF DRAFT NJPDES PERMIT NJ0028088

Notice is hereby given that:

Pabst Brewing Company
400 Grove Street
Newark, New Jersey 07106

has applied to the New Jersey Department of Environmental Protection (NJDEP) for a New Jersey Pollutant Discharge Elimination System (NJPDES) permit to discharge industrial wastewater into the Passaic Valley Sewerage Commissioners treatment plant.

This facility produces malt beverages. They generate and discharge without any pretreatment, 1.44 million gallons of wastewater per day.

This notice is being given to inform the public that NJDEP has prepared a draft NJPDES permit. This draft permit contains conditions necessary to implement the provisions of the "Regulations Concerning the New Jersey Pollutant Discharge Elimination System" (N.J.A.C. 7:14A-1 et seq.), which were promulgated pursuant to the authority of the New Jersey "Water Pollution Control Act" (N.J.S.A. 58:10A-1 et seq.), "Solid Waste Management Act" (N.J.S.A. 13:1E-1 et seq.) and the "Pretreatment Standards for Sewage" (N.J.S.A. 58:11-49 et seq.).

The draft permit prepared by NJDEP is based on the administrative record which is on file at the offices of the NJDEP, Division of Water Resources, located at 1474 Prospect Street in the Township of Ewing, Mercer County, New Jersey. It is available for inspection between 8:30 a.m. and 4:00 p.m., Monday through Friday.

Interested persons may submit written comments on the draft permit to the Assistant Director, Water Quality Management, at the address cited above. All comments shall be submitted within 30 days of the date of this public notice. All persons, including applicants, who believe that any condition of this draft permit is inappropriate or that the Department's tentative decision to issue this draft permit is inappropriate, must raise all reasonably ascertainable issues and submit all reasonably available arguments and factual grounds supporting their position, including all supporting material, by the close of the public comment period. All comments submitted by interested persons in response to this notice, within the time limit, will be considered by the NJDEP with respect to the permit

Central File Pabst

State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATER RESOURCES
P. O. BOX CN-029
TRENTON, NEW JERSEY 08625

ARNOLD SCHIFFMAN
DIRECTOR

JUN 24 1982

Mr. Michael Engleman, Plant Engineer
Pabst Brewing Company
400 Grove Street
Newark, N.J. 07106

Re: NJPDES SIU Permit Application No. NJ0028088

Dear Mr. Engleman:

This is to acknowledge that your NJPDES/SIU permit application has been received on January 18, 1982. The Department has completed its review of the above referenced permit application and has determined that it is complete in accordance with Sections 2.1 and 7.3 of the NJPDES Regulations (N.J.A.C. 7:14A-1.1 et seq.).

The Department is now proceeding with the technical review of the permit application for issuance of a draft permit which is subject to public notice. This notification, however, does not exempt or shall not be construed to exempt the applicant from submitting any information deemed necessary by the Department to complete its technical review for this permit application.

Please refer to the above permit number in all future correspondence. If you have any further questions relative to this matter, please feel free to contact MaryJo Aiello of my staff at (609) 292-4860.

Very truly yours,

Kenneth Goldstein

Kenneth Goldstein, Section Chief
Industrial Pretreatment Program
Water Quality Management

WQM8-A/f2:fmm

PABST BREWING COMPANY
400 GROVE STREET, NEWARK, NEW JERSEY 07106 (201) 373-6000

June 7, 1982

Ms. Mary Jo Aiello
N. J. Department of Environmental Protection
Division of Water Resources
1474 Prospect Street
Trenton, N.J. 08625

Dear Ms. Aiello:

We have received our laboratory analysis of a 5 day composite sample of sewer effluent. As indicated in our letter of 5-10-82, we tested for Aluminum and Magnesium. The levels are as follows, as shown on the attached copy of the laboratory report:

Aluminum	10.96 mg/1
Magnesium	8.58 mg/1

I believe this completes the data you requested. If I can be of further assistance, please let me know.

Yours Truly,

Michael Engleman

Michael Engleman
Plant Engineer

ME:lr
Attach.
C.C.: J. J. Carew
E. W. Ness
J. Ritter

RECEIVED
JUN 17 1982
State of New Jersey
Dept. Environmental Protection
Division Water Resources

Lab No: 82-65611

Date: May 31, 1982

NEW YORK TESTING LABORATORIES, INC.

P.O. BOX 484, 81 URBAN AVENUE, WESTBURY, L.I., N.Y. 11590 • (516) 334-7770 • (212) 287-1440

REPORT OF TESTS

Client — 82-65611 - Pabst Brewing Company

Material — One (1) Waste Water Sample

Client's Order No. — Pending

Identification — As Below (Sample Received 5/24/82)

Submitted for — Chemical Analysis

We find as follows:

	Sewage Water One Week Composite 5/17/82 - 5/21/28 NWK 817
pH at 20 deg. C.	6.42
Results in - (mg/l)	
Aluminum	10.96
Magnesium	8.58

Report prepared by:

Remo Gigante, Laboratory Director

We certify that this report is a true report of results obtained from our tests of this material.

Respectfully submitted,

NEW YORK TESTING LABORATORIES, INC.

G. J. Horvitz, Chief Officer

To:

Pabst Brewing Company
400 Grove Street
Newark, N. J. 07106

Att: Mr. Mike Engleman

mg

Report on sample by client applies only to sample. Report on samples by us applies only to lot sampled. [illegible] contained herein is not to be used for reproduction except by special permission.

Let's protect our earth

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD APPLICATION FORM (CP #1)
CONSTRUCTION AND DISCHARGE PERMITS

X

READ REQUIREMENTS
PLEASE TYPE OR PRINT

1. Applicant/Owner Pabst Brewing Company Telephone (201) 373-6000
   Permanent Legal Address 400 Grove Street
   City or Town Newark State New Jersey Zip Code 07106
2. Location of Work Site Same
   Name of Facility, if applicable
   Street/Road
   Lot No. see map Block No.
   City or Town State Zip Code
   Municipality County
3. If applicable, give name of: Engineer/Surveyor/Well Driller/Geologist/Soil Scientist *(Specify)*.
   Name N.A. N.J. License No.
   Name of Firm, if employee
   Address County
   Municipality State Zip Code
   Telephone ( )
4. This is an application for NJPDES/SIU Permit
   (Name of permit, certification, approval or exemption. See Item 9. Next Page.)
5. Fee is attached (if applicable). $ N.A.
   (Provide explanation of how fee was calculated. Read Requirements Section of Standard Application booklet.)
6. Estimated construction cost of project:
   a. $ N.A. total cost of the project.
   b. $ portion for which this permit is requested.
7. I have included certifications of any public notifications. Yes N.A. No
8. If applicable:
   (For Waterfront Development applications, 8c. must be completed.)
   a. Source of Water Supply City of Newark
   b. For Treatment at (Water Treatment Plant)
   c. Stream, Waterway, Pond or Lake
   d. Wastewater Treatment Facility Passaic Valley Sewerage Commission

FOLLOW INSTRUCTIONS CAREFULLY
READ REQUIREMENTS SECTION

Central File

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATER RESOURCES
1474 PROSPECT STREET
P.O. BOX CN-029
TRENTON, NEW JERSEY 08625

FACT SHEET

FOR DRAFT NJPDES PERMIT TO DISCHARGE INTO:

PASSAIC VALLEY SEWERAGE COMMISSIONER

PABST BREWING COMPANY HAS APPLIED FOR A NEW JERSEY POLLUTANT DISCHARGE ELIMINATION SYSTEM (NJPDES) PERMIT, TO THE DEPARTMENT OF ENVIRONMENTAL PROTECTION TO DISCHARGE INTO THE ABOVE DESIGNATED DOMESTIC TREATMENT WORKS.

DATE APPLICATION RECEIVED: JANUARY 18, 1982

NAME AND ADDRESS OF APPLICANT: NJPDES: NJ0028088

PABST BREWING COMPANY
400 GROVE STREET
NEWARK, NEW JERSEY 07106

NAME AND ADDRESS OF FACILITY WHERE DISCHARGE OCCURS:

PABST BREWING COMPANY
400 GROVE STREET
NEWARK, NEW JERSEY 07106

RECEIVING DOMESTIC TREATMENT WORKS OR POTW:

PASSAIC VALLEY SEWERAGE COMMISSIONERS

DESCRIPTION OF FACILITY OPERATIONS:

PABST BREWING COMPANY IS ENGAGED IN THE PRODUCTION OF MALT BEVERAGES - SIC CODE 2082. THEY GENERATE 1.44 MGD WASTEWATER WHICH THEY DISCHARGE FOR TREATMENT TO THE PASSAIC VALLEY SEWERAGE COMMISSIONERS PLANT. NO PRETREATMENT IS PROVIDED PRIOR TO DISCHARGE.

WQM80-E/PT:fmm

NJPDES: NJ0028088

PERMIT SUMMARY TABLE

COMPANY: Pabst Brewing Company

LAT: 40° 44' 35"

LOCATION: 400 Grove Street
Newark, New Jersey 07106

LONG: 74° 12' 27"

INDUSTRY TOTAL FLOW: 1.44 MGD

RECEIVING POTW: Passaic Valley Sewerage Commissioners

POTW NJPDES: NJ0021016

REVIEW ENGINEER: M.M. Aiello

POTW DESIGN CAPACITY: 300 MGD

PARAMETER	APPLICATION	PVSC ORDINANCE
FLOW	1.44 MGD	---
AVG. TEMPERATURE (°F)	32°C	less than 65°C
pH RANGE	6 - 11	5.0 - 9.0
AMMONIA AS (N) (mg/l)	14.37	---
TSS (mg/l)	833	---
TDS (mg/l)	2,658	---
OIL & GREASE (mg/l)	4.6	less than 25 mg/l
BOD_5 (mg/l)	1,462	---
COD (mg/l)	2,744	---
TOC (mg/l)	710	---
FECAL COLIFORM	----	---
COLOR	>150 PT/CO	---

WQM80-E/PT:fmm

LPRSA0042752

Let's protect our earth

Central File

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
CN 402
Trenton, N. J. 08625

PERMIT *

The New Jersey Department of Environmental Protection grants this permit in accordance with your application, attachments accompanying same application, and applicable laws and regulations. This permit is also subject to the further conditions and stipulations enumerated in the supporting documents which are agreed to by the permittee upon acceptance of the permit.

Permit No.	Issuance Date	Effective Date	Expiration Date
NJ 0028088			10-29-86

Name and Address of Applicant	Location of Activity/Facility	Name and Address of Owner
Pabst Brewing Company 400 Grove Street Newark, New Jersey 07106	Same as applicant	Pabst Brewing Company 917 West Juneau Avenue Milwaukee, Wisconsin 53201

Issuing Division	Type of Permit	Statute(s)	Application No.
[X] Water Resources [ ] Coastal Resources [ ] Environmental Quality [ ] Other	N.J. Pollutant Discharge Elimination System (NJPDES) permit SIU Indirect Discharge	N.J.S.A. 58:10A-1 et seq.	N/A

This permit grants permission to:

Discharge the wastewater generated at Pabst Brewing Company, Newark, in the preparation of malt beverages into the Passaic Valley Severage Commissioners treatment plant in conformance with the effluent limits and monitoring requirements as stated in Part III Table I and subject to additional conditions and other requirements in Parts II and III.

DRAFT

Approved by the Department of Environmental Protection
By Authority of:

Arnold Schiffman, Director
Division of Water Resources

Paul C. Kurisko, P.E.
Assistant Director
Water Quality Management

DATE

* The word permit means "approval, certification, registration, etc."

(GENERAL CONDITIONS ARE ON THE REVERSE SIDE)

DEP-007

LPRSA0042753

NPDES PERMIT NO. NJ 0028088

AUTHORIZATION TO DISCHARGE UNDER THE
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

By authority of Richard Dewling, Acting Regional Administrator, Region II U.S. Environmental Protection Agency ("EPA"), and in compliance with the provisions of the Clean Water Act, as amended, 33 U.S.C. §1251 et seq. (the "Act"),

Pabst Brewing Company

hereinafter referred to as "the Permittee" is authorized to discharge from a facility located at

400 Grove Street
Newark, New Jersey 07106

to receiving waters named

Maybaum Creek

in accordance with effluent limitations, monitoring requirements and other conditions set forth in Parts I, II, and III hereof.

This permit shall become effective on October 30, 1981.

This permit and the authorization to discharge shall expire at midnight, October 29, 1986.

Signed this 1st day of September 1981

JULIO MORALES-SANCHEZ
DIRECTOR
ENFORCEMENT DIVISION

LPRSA0042754

Form T-VWX-014
3/82

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATER RESOURCES

MONITORING REPORT — TRANSMITTAL SHEET

NJPDES NO. 0028088

REPORTING PERIOD (MO. YR.) 0884 THRU (MO. YR.) 1084

PERMITTEE:
Name
Address

FACILITY:
Name PABST BREWING COMPANY
Address 400 Grove Street
Newark, N.J. 07106 (County) Essex
Telephone (201) 373-6000

FORMS ATTACHED *(Indicate Quantity of Each)*

SLUDGE REPORTS - SANITARY
[ ] T-VWX-007 [ ] T-VWX-008 [ ] T-VWX-009

SLUDGE REPORTS - INDUSTRIAL
[ ] T-VWX-010A [ ] T-VWX-010B

WASTEWATER REPORTS
[X] T-VWX-011 [ ] T-VWX-012 [X] T-VWX-013

GROUNDWATER REPORTS
[ ] [ ] [ ]

NPDES DISCHARGE MONITORING REPORT
[ ] EPA FORM 3320-1

OPERATING EXCEPTIONS

	YES	NO
DYE TESTING	[ ]	[ ]
TEMPORARY BYPASSING	[ ]	[ ]
DISINFECTION INTERRUPTION	[ ]	[ ]
MONITORING MALFUNCTIONS	[ ]	[ ]
UNITS OUT OF OPERATION	[ ]	[ ]
OTHER	[ ]	[ ]

(Detail any "Yes" on reverse side in appropriate space.)

NOTE: *The "Hours Attended at Plant" on the reverse of this sheet must also be completed.*

AUTHENTICATION - I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

LICENSED OPERATOR
Name *(Printed)*
Grade & Registry No.
Signature
Date

PRINCIPAL EXECUTIVE OFFICER or DULY AUTHORIZED REPRESENTATIVE
Name *(Printed)* John C. Ehmann
Title *(Printed)* General Plant Manager
Signature John C Ehmann
Date November 9, 1984

LPRSA0042768

PABST BREWING COMPANY

Period from August 1, 1984 to October 31, 1984

pH levels above 10.5

August:		
	8/1	11.54
	8/7	10.6
September:	None	
October:		
	10/16	11.34

pH levels below 5.0

None

PABST BREWING COMPANY
400 GROVE STREET • NEWARK, NJ 07106 (201) 373-6000 TWX #710-995-4467

February 7, 1985

CERTIFIED REGISTERED MAIL
WITH RETURN RECEIPT

Mr. Kenneth Goldstein, P.E. Chief
Industrial Pretreatment Section
Bureau of Industrial Waste Management
NJ DEP Permit Administration
Division of Water Resources
CN 029
Trenton, NJ 08625

RECEIVED
FEB 14 1985
STATE OF NEW JERSEY
DEPT. ENVIRONMENTAL PROTECTION
DIVISION WATER RESOURCES
BUR. OF IND. WASTE MGMT.

RE: NJDEP-SIU Permit No. NJ0028088

Dear Mr. Goldstein:

Attached please find the completed Discharge Monitoring Report for the period from November 1, 1984 to January 31, 1985, and the list of dates our pH exceeded 10.5, November 27, December 7 and 27, 1984, and January 3, 1985.

Very Truly Yours,

Michael P. Engleman

Michael P. Engleman
Plant Engineer

MPE:lr
Enc.

LPRSA0042770

Form T-VWX-014
3/82

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATER RESOURCES

MONITORING REPORT — TRANSMITTAL SHEET

NJPDES NO.	REPORTING PERIOD MO. YR.		MO. YR.
0 0 2 8 0 8 8	1 1 8 4	THRU	0 1 8 5

PERMITTEE: Name ____________________

Address ____________________

____

FACILITY: Name PABST BREWING COMPANY

Address 400 Grove Street

Newark, NJ 07106 (County) Essex

Telephone (201) 373-6000

FORMS ATTACHED *(Indicate Quantity of Each)*

SLUDGE REPORTS - SANITARY

[ ] T-VWX-007 [ ] T-VWX-008 [ ] T-VWX-009

SLUDGE REPORTS - INDUSTRIAL

[ ] T-VWX-010A [ ] T-VWX-010B

WASTEWATER REPORTS

[X] T-VWX-011 [ ] T-VWX-012 [X] T-VWX-013

GROUNDWATER REPORTS

[ ] [ ] [ ]

NPDES DISCHARGE MONITORING REPORT

[ ] EPA FORM 3320-1

OPERATING EXCEPTIONS

	YES	NO
DYE TESTING	[ ]	[ ]
TEMPORARY BYPASSING	[ ]	[ ]
DISINFECTION INTERRUPTION	[ ]	[ ]
MONITORING MALFUNCTIONS	[ ]	[ ]
UNITS OUT OF OPERATION	[ ]	[ ]
OTHER	[ ]	[ ]

(Detail any "Yes" on reverse side in appropriate space.)

NOTE: The "Hours Attended at Plant" on the reverse of this sheet must also be completed.

AUTHENTICATION - I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

LICENSED OPERATOR		PRINCIPAL EXECUTIVE OFFICER or DULY AUTHORIZED REPRESENTATIVE	
Name *(Printed)*		Name *(Printed)*	John C. Ehmann
Grade & Registry No.		Title *(Printed)*	General Plant Manager
Signature		Signature	JCEhmann
Date		Date	February 7, 1985

LPRSA0042771

PABST BREWING COMPANY

Period from November 1, 1984 to January 31, 1985

pH levels above 10.5

. . .

November 27, 1984	11.34
December 7, 1984	11.08
December 27, 1984	11.38
January 3, 1985	11.48

pH level below 5.0

None

J L

RECEIVED

MAY 21 1985

STATE OF NEW JERSEY
DEPT. ENVIRONMENTAL PROTECTION
DIVISION WATER RESOURCES
BUR. OF IND. WASTE MGNT.

PABST BREWING COMPANY

400 GROVE STREET • NEWARK, NJ 07106 (201) 373-6000 TWX #710-995-4467

May 14, 1985

CERTIFIED REGISTERED MAIL
WITH RETURN RECEIPT

Mr. Kenneth Goldstein, P.E. Chief
Industrial Pretreatment Section
Bureau of Industrial Waste Management
NJ DEP Permit Administration
Division of Water Resources
CN 029
Trenton, NJ 08625

Re: NJDEP-SIU Permit No. NJ0028088

Dear Mr. Goldstein:

Attached please find the completed Discharge Monitoring Report for the period from February 1, 1985 to April 30, 1985, and the list of dates our pH exceeded 10.5, February 6, 8, 11, 15, April 3, 15, 1985.

Very Truly Yours,

Michael P. Engleman

Michael P. Engleman
Plant Engineer

MPE:lr
Enc.

LPRSA0042773

PABST BREWING COMPANY

400 GROVE STREET, NEWARK, NEW JERSEY 07106 (201) 373-6000

February 6, 1984

CERTIFIED REGISTERED MAIL
WITH RETURN RECEIPT

Assistant Director
Water Quality Management
NJPDES Permit Administration
Division of Water Resources
P.O. Box 029
Trenton, N.J. 08625

Re: NJPDES/SIU Permit No. NJ0028088

Dear Sir:

Attached please find the completed Discharge Monitoring Report for the period from November 1, 1983 to January 31, 1984 and the list of dates our pH exceeded 10.5, December 6, 1983 and January 25, 1984.

Very truly yours,

Michael P. Engleman

Michael P. Engleman
Plant Engineer

MPE:lr
Enc.

PABST BREWING COMPANY

Period from November 1, 1983 to January 31, 1984

pH levels above 10.5

DECEMBER:

12/6	11.00

JANUARY:

1/25	12.13

pH levels below 5.0

None

ME:lr
2/6/84

PABST BREWING COMPANY
400 GROVE STREET, NEWARK, NEW JERSEY 07106 (201) 373-6000

August 14, 1984

CERTIFIED REGISTERED MAIL
WITH RETURN RECEIPT

Assistant Director
Water Quality Management
NJPDES Permit Administration
Division of Water Resources
P.O. Box 029
Trenton, N.J. 08625

Re: NJPDES/SIU Permit No. NJ0028088

Dear Sir:

Attached please find the completed Discharge Monitoring Report for the period from May 1, 1984 to July 31, 1984 and the list of dates our pH exceeded 10.5, May 22nd, June 4th and 6th, July 17th, 18th and 31st, 1984.

Very truly yours,

Michael P. Engleman/L.R.

Michael P. Engleman
Plant Engineer

MPE:lr
Enc.

RECEIVED
AUG - 1 1984
STATE OF NEW JERSEY
DEPT. ENVIRONMENTAL PROTECTION
DIVISION WATER RESOURCES

PABST BREWING COMPANY

Period from May 1, 1984 to July 31, 1984

pH levels above 10.5

MAY:

5/22	11.67

JUNE:

6/4	10.66
6/6	11.47

JULY:

7/17	11.6
7/18	10.97
7/31	10.54

pH levels below 5.0

None

PABST BREWING COMPANY

400 GROVE STREET, NEWARK, NEW JERSEY 07106 (201) 373-6000

February 9, 1983

Assistant Director for Operations
and Enforcement
Division of Water Resources
N.J. Departmental of Environmental Protection
Agency
P.O. Box 2809
Trenton, New Jersey 08625

Re: <u>NPDES Permit No. NJ0028088</u>

Dear Sir:

Attached please find a copy of our discharge Monitoring Report for the period from August 1, 1982 to January 31, 1983.

We have found that due to our present operating method, we are unable to meet the COD load limitation and have been diverting all of the non-contact cooling water to the sanitary sewer during the period.

We trust this information fully conforms to the requirements of the above subject permit.

Very truly yours,

M.P. Engleman
Plant Engineer

RECEIVED
FEB 15 10 23 AM '83
NJ DEPT. [illegible]
DIV WATER RESOURCES
MS&E

MPE:
Attachment

Form T-VWX-014
3/82

N JERSEY DEPARTMENT OF ENVIRONMEN . PROTECTION
DIVISION OF WATER RESOURCES

MONITORING REPORT – TRANSMITTAL SHEET

NJPDES NO.	REPORTING PERIOD MO. YR.		MO. YR.
0 0 2 8 0 8 8	0 2 8 3	THRU	0 4 8 3

PERMITTEE: Name

Address

FACILITY: Name Pabst Brewing Company

Address 400 Grove Street

Newark, N.J. 07108 (County) Essex

Telephone (201) 373-6000

FORMS ATTACHED *(Indicate Quantity of Each)*

SLUDGE REPORTS - SANITARY

☐ T-VWX-007 ☐ T-VWX-008 ☐ T-VWX-009

SLUDGE REPORTS - INDUSTRIAL

☐ T-VWX-010A ☐ T-VWX-010B

WASTEWATER REPORTS

☐ T-VWX-011 ☐ T-VWX-012 ☐ T-VWX-013

GROUNDWATER REPORTS

☐ ☐ ☐

NPDES DISCHARGE MONITORING REPORT

☐ EPA FORM 3320-1

OPERATING EXCEPTIONS

	YES	NO
DYE TESTING	☐	☐
TEMPORARY BYPASSING	☐	☐
DISINFECTION INTERRUPTION	☐	☐
MONITORING MALFUNCTIONS	☐	☐
UNITS OUT OF OPERATION	☐	☐
OTHER	☒	☐

(Detail any "Yes" on reverse side in appropriate space.)

NOTE: The "Hours Attended at Plant" on the reverse of this sheet must also be completed.

AUTHENTICATION - I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment

LICENSED OPERATOR

Name *(Printed)*

Grade & Registry No.

Signature

Date

PRINCIPAL EXECUTIVE OFFICER or
DULY AUTHORIZED REPRESENTATIVE

Name *(Printed)* John C. Ehmann

Title *(Printed)* General Plant Manager

Signature John C. Ehmann

Date May 2, 1983

LPRSA0042779

( )

OPERATING EXCEPTIONS DETAILED

This Report covers the period from February 1, 1983 to April 30, 1983. We have found that due to our present operating method, we are unable to meet the COD Load Limitation and have been diverting all of the non-contact cooling water to the sanitary sewer during the period.

HOURS ATTENDED AT PLANT Month Year

Day of Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Licensed Operator																
Others																
Day of Month	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
Licensed Operator																
Others																

LPRSA0042780

PABST BREWING COMPANY
400 GROVE STREET, NEWARK, NEW JERSEY 07106 (201) 373-6000

July 11, 1983

NJDEP - Water Resources
WQM - DMR
CN - 029
Trenton, New Jersey 08625

Re: NPDES Permit No. NJ0028088   Attention: Permits Administration Branch

Gentlemen:

Attached please find our Discharge Monitoring Report for the period from February 1, 1983 to July 31, 1983.

We have found that due to our present operating method, we are unable to meet the COD load limitation and have been diverting all of the non-contact cooling water to the sanitary sewer during the period.

We trust this information fully conforms to the requirements of the above subject permit.

Very truly yours,

M. Engleman
Plant Engineer

ME:lr
Attachment

RECEIVED
JUL 20 1983
State of New Jersey
Dept. Environmental Protection
Division Water Resources

LPRSA0042781

CMH

PABST BREWING COMPANY
400 GROVE STREET, NEWARK, NEW JERSEY 07106 (201) 373-6000

August 3, 1983

CERTIFIED REGISTERED MAIL
WITH RETURN RECEIPT

Assistant Director
Water Quality Management
NJPDES Permit Administration
Division of Water Resources
P.O. Box CN 029
Trenton, N.J. 08625

Re: NJPDES/SIU Permit No. NJ0028088

Dear Sir:

Attached please find the completed Discharge Monitoring Report and the list of dates our pH exceeded 10.5, for the period from May 1, 1983 to July 31, 1983.

Very Truly Yours,

Michael Engleman

Michael Engleman
Plant Engineer

ME:lr
Enc.

RECEIVED
AUG 04 1983

LPRSA0042782

RECEIVED
AUG 17 12 PM '82
NJ DEP
DIV WATER RESOURCES

PABST BREWING COMPANY
400 GROVE STREET, NEWARK, NEW JERSEY 07106 (201) 373-6000

August 13, 1982

Assistant Director for Operations
and Enforcement
Division of Water Resources
N.J. Department of Environmental Protection
Agency
P.O. Box 2809
Trenton, New Jersey 08625

Re: NPDES Permit No. NJ0028088

Dear Sir:

Attached please find our Discharge Monitoring Report for the period from February 1, 1982 to June 31, 1982.

We have found that due to our present operating method, we are unable to meet the COD load limitation and have been diverting all of the non-contact cooling water to the sanitary sewer during the period.

We trust this information fully conforms to the requirements of the above subject permit.

Very truly yours,

M. P. Engleman
Plant Engineer

MPE:lr
Attachment

LPRSA0042783

PABST BREWING COMPANY

400 GROVE STREET, NEWARK, NEW JERSEY 07106

RECEIVED
MAY 15 1 15 PM '79
NJ DEPT. ENV. PROT.
DIV WATER RESOURCES
M&E

May 11, 1979

Assistant Director for Operations
and Enforcement
Division of Water Resources
N.J. Department of Environmental Protection
Agency
P.O. Box 2809
Trenton, New Jersey 08625

Re: NPDES Permit No. NJ0028088

Dear Sir:

Attached please find a copy of our Discharge Monitoring Report for the period from February 1, 1979 to April 30, 1979.

We trust this information fully conforms to the requirements of the above subject permit.

Yours very truly,

H. A. Blair

H. A. Blair, P.E.
Plant Engineer

HAB:MR
Attachment

Brewers of Pabst Blue Ribbon Beer, Andeker Beer, Eastside Beer

MILWAUKEE WISCONSIN · PEORIA HEIGHTS ILLINOIS · NEWARK, NEW JERSEY · LOS ANGELES CALIFORNIA · PABST GEORGIA

PABST BREWING COMPANY

400 GROVE STREET, NEWARK, NEW JERSEY

RECEIVED
FEB 20 10 59 AM '79
DEPT ENV PROTECTION
DIV WATER RESOURCES
MS&E

February 15, 1979

Assistant Director for Operations
and Enforcement
Division of Water Resources
N.J. Department of Environmental Protection
Agency
P.O. Box 2809
Trenton, New Jersey 08625

Re: NPDES Permit No. NJ0028088

Dear Sir:

Attached please find a copy of our Discharge Monitoring Report for the period from November 1, 1978 to January 31, 1979.

We trust this information fully conforms to the requirements of the above subject permit.

Yours very truly,

H. A. Blair

H. A. Blair, P.E.
Plant Engineer

HAB:MR
Attachment

Brewers of Pabst Blue Ribbon Beer, Andeker Beer, Eastside Beer

MILWAUKEE, WISCONSIN · PEORIA HEIGHTS, ILLINOIS · NEWARK, NEW JERSEY · LOS ANGELES, CALIFORNIA · PABST, GEORGIA

FACILITY:NAME:

PABST BREWING CO

TOWNSHIP/MUNICIPALITY:

NEWARK

NJPDES #:

NJ 0028088

DATES:

1975 - 1975

DESCRIPTION:

APPLIC

Rec'd ... 4/... 4.0

cert only Letter 3/13/81 (3/2/81)
Due 4/6/81

Draft Permit 060

FORM APPROVED
OMB No. 158–R0100

FOR AGENCY USE

NJ0028088

X

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
APPLICATION FOR PERMIT TO DISCHARGE WASTEWATER

STANDARD FORM C – MANUFACTURING AND COMMERCIAL

SECTION I. APPLICANT AND FACILITY DESCRIPTION

Unless otherwise specified on this form all items are to be completed. If an item is not applicable indicate 'NA.'

ADDITIONAL INSTRUCTIONS FOR SELECTED ITEMS APPEAR IN SEPARATE INSTRUCTION BOOKLET AS INDICATED. REFER TO BOOKLET BEFORE FILLING OUT THESE ITEMS.

Please Print or Type

1. Legal Name of Applicant (see instructions): Pabst Brewing Company

2. Mailing Address of Applicant (see instructions)
   - Number & Street: 917 West Juneau Avenue
   - City: Milwaukee
   - State: Wisconsin
   - Zip Code: 53201

3. Applicant's Authorized Agent (see instructions)
   - Name and Title: H. A. Blair, Plant Engineer
   - Number & Street Address: 400 Grove Street
   - City: Newark
   - State: New Jersey
   - Zip Code: 07106
   - Telephone: 201 (Area Code) 373-6000 (Number)

4. Previous Application
   If a previous application for a National or Federal discharge permit has been made, give the date of application. Use numeric designation for date.
   YR MO DAY

ENVIRONMENTAL PROTECTION AGENCY ... SECTION NEW YORK, N.Y. 10007
APR 23 4 12 PM '75
... BRANCH ... COMPLIANCE

K-64

I certify that I am familiar with the information contained in this application and that to the best of my knowledge and belief such information is true, complete, and accurate.

J. J. Carew
Printed Name of Person Signing

Plant Manager
Title

Jere J. Carew
Signature of Applicant or Authorized Agent

75 4 21
YR MO DAY
Date Application Signed

18 U.S.C. Section 1001 provides that:

Whoever, in any matter within the jurisdiction of any department or agency of the United States knowingly and wilfully falsifies, conceals or covers up by any trick, scheme, or device a material fact, or makes any false, fictitious or fraudulent statement or representation, or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statement or entry, shall be fined not more than $10,000 or imprisoned not more than five years, or both.

FOR AGENCY USE

5. **Facility/Activity** (see instructions) Give the name, ownership, and physical location of the plant or other operating facility where discharge(s) does or will occur.		FOR AGENCY USE
Name	Pabst Brewing Company	NJ 0028088 APR 23 1975
Ownership (Public, Private or Both Public and Private)	☒ PUB ☐ PRV ☐ BPP	
Check block if Federal Facility and give GSA Inventory Control Number	☐ FED	
Location		
Street & Number	400 Grove Street	
City	Newark	
County	Essex	
State	New Jersey	
6. **Nature of Business** State the nature of the business conducted at the plant or operating facility.	Malt Beverages	
	AGENCY USE	
7. **Facility Intake Water** (see instructions) Indicate water intake volume per day by sources. Estimate average volume per day in thousand gallons per day.		
Municipal or private water system	1502.96	thousand gallons per day
Surface water	N.A.	thousand gallons per day
Groundwater	450.67	thousand gallons per day
Other*	N.A.	thousand gallons per day
Total Item 7	1953.63	thousand gallons per day
*If there is intake water from 'other,' specify the source.		
8. **Facility Water Use** Estimate average volume per day in thousand gallons per day for the following types of water usage at the facility. (see instructions)		
Noncontact cooling water	158.1	thousand gallons per day
Boiler feed water	12.8	thousand gallons per day
Process water (including contact cooling water)	1764.73	thousand gallons per day
Sanitary water	18	thousand gallons per day
Other*	N.A.	thousand gallons per day
Total Item 8	1953.63	thousand gallons per day
*If there are discharges to 'other,' specify.		
If there is 'Sanitary' water use, give the number of people served.	900	people served

EPA Form 7550-23 (7-73)

FOR AGENCY USE

NJ 0028088

APR 23 1975

5. **Facility/Activity** (see instructions) Give the name, ownership, and physical location of the plant or other operating facility where discharge(s) does or will occur.

Name	Pabst Brewing Company
Ownership (Public, Private or Both Public and Private)	☒ PUB ☐ PRV ☐ BPP
Check block if Federal Facility and give GSA Inventory Control Number	☐ FED
Location	
Street & Number	400 Grove Street
City	Newark
County	Essex
State	New Jersey

6. **Nature of Business** State the nature of the business conducted at the plant or operating facility.

Malt Beverages

AGENCY USE

7. **Facility Intake Water** (see instructions) Indicate water intake volume per day by sources. Estimate average volume per day in thousand gallons per day.

Municipal or private water system	1502.96	thousand gallons per day
Surface water	N.A.	thousand gallons per day
Groundwater	450.67	thousand gallons per day
Other*	N.A.	thousand gallons per day
Total Item 7	1953.63	thousand gallons per day

*If there is intake water from 'other,' specify the source.

8. **Facility Water Use** Estimate average volume per day in thousand gallons per day for the following types of water usage at the facility. (see instructions)

Noncontact cooling water	158.1	thousand gallons per day
Boiler feed water	12.8	thousand gallons per day
Process water (including contact cooling water)	1764.73	thousand gallons per day
Sanitary water	18	thousand gallons per day
Other*	N.A.	thousand gallons per day
Total Item 8	1953.63	thousand gallons per day

*If there are discharges to 'other,' specify.

If there is 'Sanitary' water use, give the number of people served. 900 people served

EPA Form 7550-23 (7-73)

LPRSA0042789

FORM APPROVED
OMB No. 158–R0100

FOR AGENCY USE

NJ 0028088

9. All Facility Discharges and other Losses; Number and Discharge (see instructions) Volume. Specify the number of discharge points and the volume of water discharged or lost from the facility according to the categories below. Estimate average volume per day in thousand gallons per day.

	Number of Discharge Points	Total Volume Used or Discharged, Thousand Gal/Day
Surface Water	N.A.	N.A.
Sanitary wastewater transport system	1	1407.37
Storm water transport system	1	158.1
Combined sanitary and storm water transport system	N.A.	N.A.
Surface impoundment with no effluent	N.A.	N.A.
Underground percolation	N.A.	N.A.
Well injection	N.A.	N.A.
Waste acceptance firm	2	38.17
Evaporation	15	81.98
Consumption	1	268.01
Other*	N.A.	N.A.
Facility discharges and volume Total Item 9.	20	1953.63

*If there are discharges to 'other,' specify.

10. Permits, Licenses and Applications
List all existing, pending or denied permits, licenses and applications related to discharges from this facility (see instructions).

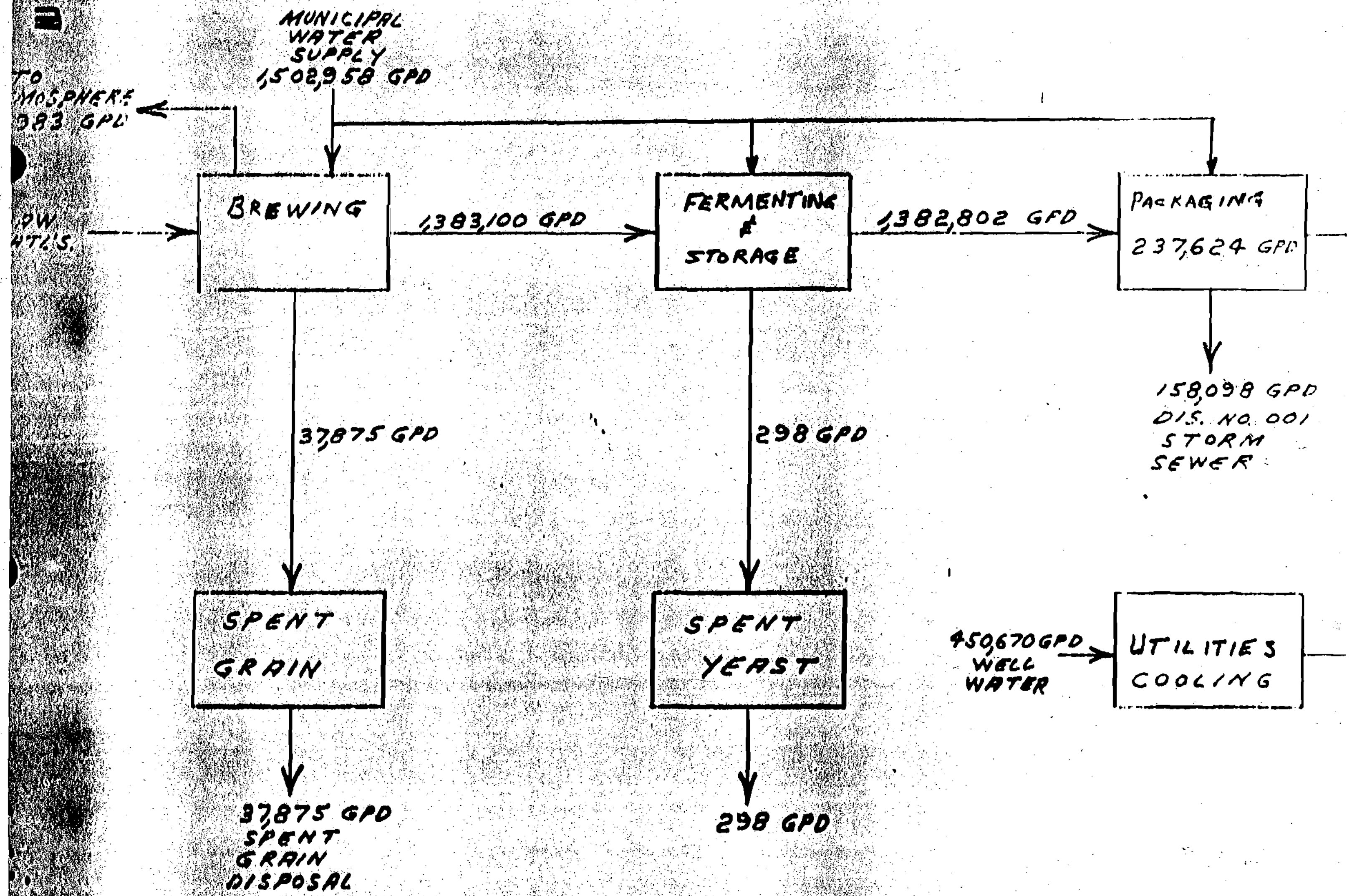
	Issuing Agency	For Agency Use	Type of Permit or License	ID Number	Date Filed YR/MO/DA	Date Issued YR/MO/DA	Date Denied YR/MO/DA	Expiration Date YR/MO/DA
1.	USEPA		Short Form C	NJ 0028088	73/4/4	-	-	-
2.	USEPA		Short Form C Amended	NJ 0028088	74/12/23	-	-	-
3.								

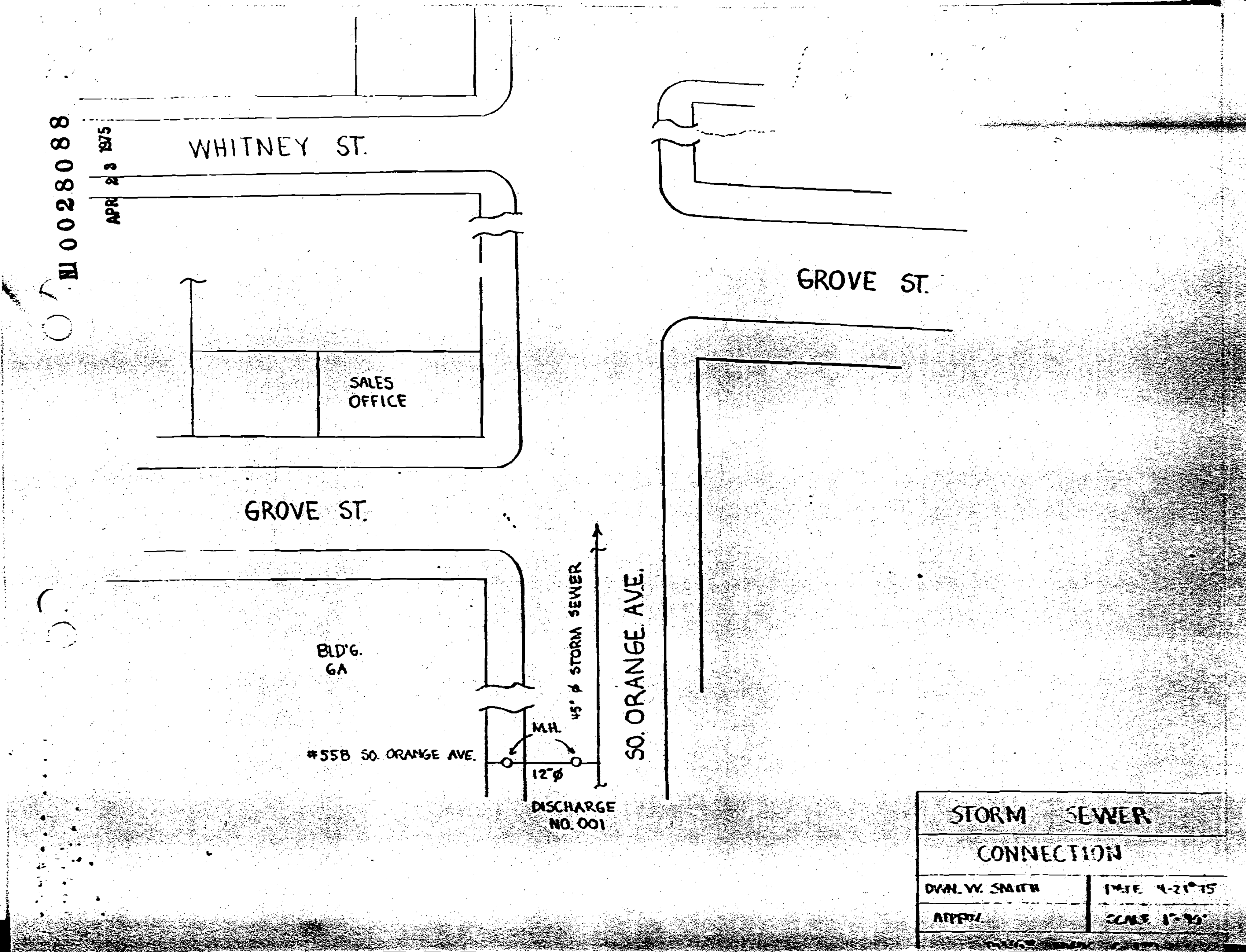
11. Maps and Drawings
Attach all required maps and drawings to the back of this application. (see instructions)

12. Additional Information

Item Number	Information

SCHEMATIC OF WATER FLOW
PABST BREWING COMPANY
NEWARK, ESSEX, NEW JERSEY
APRIL 21, 1975




NJ0028088
APR 23 1975
WHITNEY ST.
GROVE ST.
SALES OFFICE
GROVE ST.
BLD'G. 6A
45' ø STORM SEWER
SO. ORANGE AVE.
M.H.
#55B SO. ORANGE AVE.
12"ø
DISCHARGE NO. 001
STORM SEWER
CONNECTION

FORM APPROVED
OMB No. 158–R0100

APR 1975

FOR AGENCY USE

STANDARD FORM C – MANUFACTURING AND COMMERCIAL

SECTION II. BASIC DISCHARGE DESCRIPTION

NJ 0028088

Complete this section for each discharge indicated in Section I, Item 9, that is to surface waters. This includes discharges to municipal sewerage systems in which the wastewater does not go through a treatment works prior to being discharged to surface waters. Discharges to wells must be described where there are also discharges to surface waters from this facility. SEPARATE DESCRIPTIONS OF EACH DISCHARGE ARE REQUIRED EVEN IF SEVERAL DISCHARGES ORIGINATE IN THE SAME FACILITY. All values for an existing discharge should be representative of the twelve previous months of operation. If this is a proposed discharge, values should reflect best engineering estimates.

ADDITIONAL INSTRUCTIONS FOR SELECTED ITEMS APPEAR IN SEPARATE INSTRUCTION BOOKLET AS INDICATED. REFER TO BOOKLET BEFORE FILLING OUT THESE ITEMS.

1. Discharge Serial No. and Name
   a. Discharge Serial No. (see instructions) — 001
   b. Discharge Name Give name of discharge, if any. (see instructions) — South Orange Avenue Storm Sewer
   c. Previous Discharge Serial No. If previous permit application was made for this discharge (see Item 4, Section I), provide previous discharge serial number. — N.A.

2. Discharge Operating Dates
   a. Discharge Began Date If the discharge described below is in operation, give the date (within best estimate) the discharge began. — 65 YR 8 MO
   b. Discharge to Begin Date If the discharge has never occurred but is planned for some future date, give the date (within best estimate) the discharge will begin. — ___ YR ___ MO
   c. Discharge to End Date If discharge is scheduled to be discontinued within the next 5 years, give the date (within best estimate) the discharge will end. — ___ YR ___ MO

3. Engineering Report Available Check if an engineering report is available to reviewing agency upon request. (see instructions) — ☐

4. Discharge Location Name the political boundaries within which the point of discharge is located.

Agency Use

State	New Jersey
County	Essex
(if applicable) City or Town	Newark

5. Discharge Point Description Discharge is into (check one): (see instructions)
   - Stream (includes ditches, arroyos, and other intermittent watercourses) — ☐STR
   - Lake — ☐LKE
   - Ocean — ☐OCE
   - Municipal Sanitary Wastewater Transport System — ☐MTS
   - Municipal Combined Sanitary and Storm Transport System — ☐MCS

LPRSA0042793

DISCHARGE SERIAL NUMBER

001

FOR AGENCY USE

NJ 0028088

APR 3 1975

Municipal Storm Water Transport System — ☒ STS

Well (Injection) — ☐ WEL

Other — ☐ OTH

If 'other' is checked, specify

6. Discharge Point — Lat/Long Give the precise location of the point of discharge to the nearest second.

   Latitude ____DEG ____MIN ____SEC

   Longitude ____DEG ____MIN ____SEC

7. Discharge Receiving Water Name Name the waterway at the point of discharge.(see instructions)

   Maybaum Creek - Rahway River

For Agency Use		
Major	Minor	Sub

For Agency Use
303e

If the discharge is through an outfall that extends beyond the shoreline or is below the mean low water line, complete item 8.

8. Offshore Discharge

   a. Discharge Distance from Shore — N.A. feet

   b. Discharge Depth Below Water Surface — ____ feet

9. Discharge Type and Occurrence

   a. Type of Discharge Check whether the discharge is continuous or intermittent. (see instructions)

   ☒ (con) Continuous

   ☐ (int) Intermittent

   b. Discharge Occurrence Days per Week Enter the average number of days per week (during periods of discharge) this discharge occurs.

   7 days per week

   c. Discharge Occurrence — Months If this discharge normally operates (either intermittently, or continuously) on less than a year-around basis (excluding shutdowns for routine maintenance), check the months during the year when the discharge is operating. (see instructions)

   ☐ JAN ☐ FEB ☐ MAR ☐ APR

   ☐ MAY ☐ JUN ☐ JUL ☐ AUG

   ☐ SEP ☐ OCT ☐ NOV ☐ DEC

Complete items 10 and 11 if "intermittent" is checked in item 9.a. Otherwise, proceed to item 12.

10. Intermittent Discharge Quantity State the average volume per discharge occurrence in thousands of gallons.

   N.A. thousand gallons per discharge occurrence.

11. Intermittent Discharge Duration and Frequency

   a. Intermittent Discharge Duration Per Day State the average number of hours per day the discharge is operating.

   N.A. hours per day

   b. Intermittent Discharge Frequency State the average number of discharge occurrences per day during days when discharging.

   N.A. discharge occurrences per day

12. Maximum Flow Period Give the time period in which the maximum flow of this discharge occurs.

   From N.A. to ____
   month month

0028088

RECEIVED
MAY 27 1981
State of New Jersey
Dept. Environmental Protection
Division Water Resources

PABST BREWING COMPANY

400 GROVE STREET, NEWARK, NEW JERSEY 07106 (201) 373-6000

May 22, 1981

State of New Jersey
Department of Environmental Protection
Division of Water Resources
P.O. Box CN-029
Trenton, New Jersey 08625

Re: NJPDES/D SW Permit

Attention: Dr. Marwan M. Sadat, Assistant Director
Water Quality Management

Dear Sir:

This is to confirm our telephone conversation of May 18, 1981, concerning the initial billing for NJPDES Permit No. NJ-0028088. We do not understand how you arrived at the annual fee of $6,650.

We have been dumping cooling water, purchased from the City of Newark, into the South Orange Avenue storm sewer since 1964. This, at the suggestion of the City of Newark, to avoid hydraulically overloading the sanitary sewer system.

In 1976, after passage of the Federal Clean Water Act, we learned that we had to have a National Pollutant Discharge Elimination System Permit because the storm sewer empties into the Rahway River and the Atlantic Ocean. Upon application, Permit #NJ0028088 was issued May 1, 1976. This permit limits us to a maximum of 12.3 COD kilograms per day.

On December 3, 1980, Mr. Charles L. Maack, Principal Environmental Engineer for the State of New Jersey, informed us we were exceeding the COD load limit. We replied that due to the water emergency, we had reduced the water flow for conservation reasons and would divert the effluent to the sanitary sewer until such time that we could meet the load limit. That limit incidentally, does not take into consideration the fact that the City of Newark's potable water as supplied to us, has a COD of 10 mg./l. As of this date, the water is still being diverted.

Based on a five year average of the daily flow and COD, we have calculated the permit invoice to be $550.

$$\text{FEE} = -4260.0469 + 2736.0809\ (5.6\ \text{COD})^{1/3}$$

This would be much more equitable as the 63.381 COD kg/day used in your calculation even exceeds our NJPDES permit limitation.

LPRSA0042802

State of New Jersey (Cont.) May 22, 1981

Should you have any questions regarding this matter, please feel free to contact this office at (201) 373-6000.

Very truly yours,

PABST BREWING COMPANY

H. A. Blair, P.E.
Plant Engineer

HAB:MR

ADM-012

MEMO

NEW JERSEY STATE DEPARTMENT OF ENVIRONMENTAL PROTECTION

TO Toni Osvai, Chief
Bureau of Collections and Licensing

FROM Teresa Lunt/DWR TL DATE AUG 20 1981

SUBJECT NJPDES Bills

We have recalcualted the NJPDES fees for the following facilities which had already paid a larger amount and which will therefore need to be mailed refunds.

NJPDES #	Cat.	Name and Address	Amt. Paid	New Fee	Amt. to be Refunded
0002691	B	Ford Motor Co.- Metuchen Assem. Plant P.O. Box F Edison, NJ 08817	100.	0.	100.
0028088	B	Pabst Brewing Co. 400 Grove Street Newark, NJ 07106	6650.	700.	5950.
0021857	A	Sussex Borough 2 Main Street Sussex, NJ 07461	610.	100.	510.
0004596	B	New Jersey Zinc Co. Plant Street Ogdensburg, NJ 07439	1080.	100.	980.
0001236	B	Welsh Farms Inc. 55 Fairview Avenue Long Valley, NJ 07853	3310.	1720.	1590.
0005096	B	Griffin Pipe Products Works Manager 1100 West Front St. Florence, NJ 08518	7730.	6210.	1120.

Please see that these refunds are issued if you have not already done so. If there are any problems, please call me at 2-5262.

Thanks for all your help.

WQM33-E/3:caz

cc: Assistant Director Sadat
Mr. Steve Waddell

NJPDES FILES TARGET SHEET

FACILITY NAME:

Pabst Brewing Company

TOWNSHIP/CO.:

Newark, Essex

NJPDES NUMBER:

NJ 0028088

DATE (YY TO YY):

1983 - 1987

DESCRIPTION:

CORRESP

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATER RESOURCES
METRO BUREAU OF REGIONAL ENFORCEMENT
2 BABCOCK PLACE
WEST ORANGE, NEW JERSEY 07052

GEORGE G. McCANN P.E.
DIRECTOR

DIR
DE

May 18, 1987

Mr. Michael Engelman
Plant Engineer
Pabst Brewing Company
400 Grove Street
Newark, NJ 07106

Re: The New Jersey Pollutant Discharge Elimination System
Pabst Brewing Company/NJPDES No. NJ 0028088
Newark/Essex County

Dear Mr. Engelman:

On February 19, 1987, representatives of the Division of Water Resources (DWR) conducted a Compliance Evaluation Inspection at the Pabst Brewing Company facility in Newark, New Jersey. A copy of the inspection report is enclosed for your information.

If you have any questions, please contact this office at (201) 669-3900.

Very truly yours,

Richard White

Richard White
Environmental Compliance
Investigator
Metro Bureau of
Regional Enforcement

E9:G25

cc: Dr. Richard A. Baker, USEPA
Mr. Paul Molinari, USEPA
Mr. Robert J. Grimm, H.O.

Enclosure

bcc: Mohammed Z. Hussain

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATER RESOURCES
CN 029, Trenton, N.J. 08625

DISCHARGE SURVEILLANCE REPORT

PERMIT # NJ0028088 NO. OF DISCHARGES 002 CLASS Min.-Ind.

DISCHARGER Pabst Brewing Company

OWNER Pabst Brewing Company

MUNICIPALITY Newark COUNTY Essex WATERSHED CODE 001 - Metro 002 - Upper NY Bay

LOCATION 400 Grove Street

RECEIVING WATERS 001 - Maybaum Creek 002 - PVSC. → Upper NY Bay STREAM CLASS FW2 SE3

LICENSED OPERATOR & PLANT CLASS ——

TRAINEE/ASSISTANT —— OTHER INFO. (201) 373-6000

DEFICIENCIES OR COMMENTS

Not Rated - Manufacturing Operations Shut Down June 1985.

Note: Facility must file for an Affidavit of Exemption to terminate its permit. Information on affidavits of exemption can be obtained from the Bureau of Permits Administration at (609) 984-4428.

OVERALL RATING ☐ Acceptable ☐ Conditionally Acceptable ☐ Unacceptable

EVALUATOR Joseph E. Liccese / James J. Genovese TITLE Environmental Compliance Investigator / Environmental Specialist

INFORMATION FURNISHED BY (Name) Mr. Frank Kellatt

(Title) Comptroller (Organization) Pabst Brewing Co

DATE OF INSPECTION February 19, 1987

Form DWR-053
3/81

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATER RESOURCES
CN 029, Trenton, N.J. 08625

DISCHARGE SURVEILLANCE REPORT

PERMIT # NJ0028088 NO. OF DISCHARGES 002 CLASS MAJ.-IND

DISCHARGER PABST BREWING COMPANY

OWNER PABST BREWING COMPANY

MUNICIPALITY NEWARK COUNTY ESSEX WATERSHED CODE METRO

LOCATION 400 GROVE STREET

RECEIVING WATERS P.V.S.C. STREAM CLASS P.V.S.C.

~~LICENSED OPERATOR & PLANT CLASS~~ MR. JOHN C EHMANN

~~TRAINEE/ASSISTANT~~ GENERAL PLANT MANAGER OTHER INFO. 373-6000

DEFICIENCIES OR COMMENTS

- NONE -

OVERALL RATING ☒ Acceptable ☐ Conditionally Acceptable ☐ Unacceptable

RICHARD WHITE
EVALUATOR LORETTA WEINMAN TITLE ENVIRONMENTAL COMPLIANCE INVESTIGATOR

INFORMATION FURNISHED BY (Name) MR. MICHAEL ENGLEMAN

(Title) PLANT ENGINEER (Organization) PABST BREWING COMPANY

DATE OF INSPECTION 4/3/85

LPRSA0042819

Form DWR-063-A
4/78

N.J.D.E.P.
D.W.R.
DISCHARGE SURVEILLANCE REPORT

Permit #: NJ00280
Date: 4/3/85

INDUSTRIAL TREATMENT PROCESS EVALUATION

RATING CODES: S = Satisfactory M = Marginal U = Unsatisfactory NA = Not Applicable

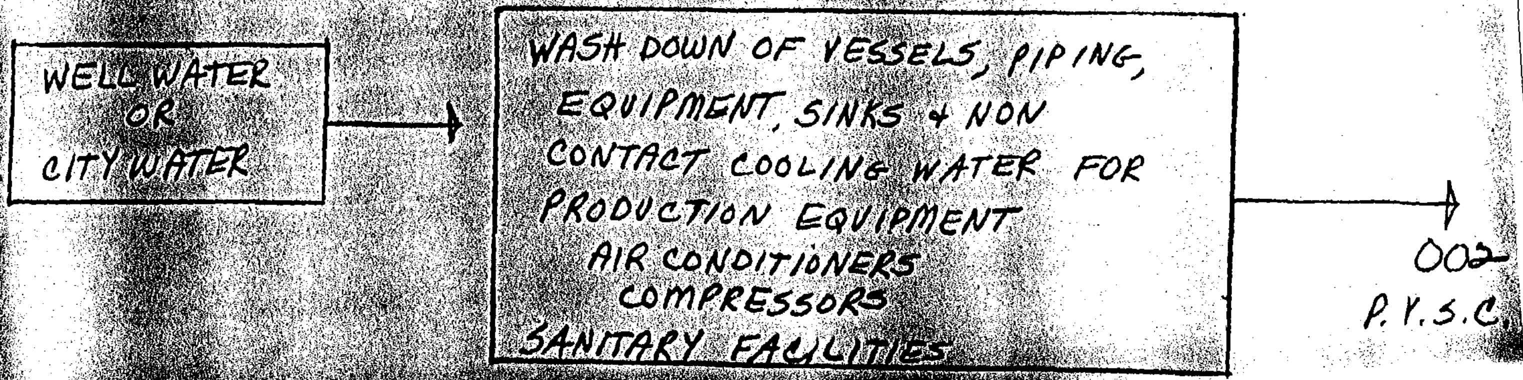
		RATING	COMMENTS
GENERAL	DISCHARGE # 002	---	
	WASTEWATER SOURCE(S)	---	WASH DOWN OF VESSELS, PIPING, EQUIPMENT, SINKS
	CONTINUITY OF OPERATION	---	24 HRD DAY/5 DAYS WK. & N.C.C.W. FOR COMPRESSOR
	BYPASSES/OVERFLOWS		AIR CONDITIONERS
	S.P.C.C. PLAN	NA	NO FUEL OIL STORED
	ALARM SYSTEMS	NA	ABOVE GROUND. IN
	ALTERNATE POWER SUPPLY	NA	HOUSE SPCC PLAN
			IN CASE OF OIL SPILL.
TREATMENT PROCESSES	NONE	NA	
SLUDGE HANDLING	DISPOSAL SITE	NA	
INFORMATION	FLOW METER & RECORDER	S	FLOW METER
	RECORDS	S	
	SAMPLING PROCEDURES	S	COMPANY PERSONNEL & P.V.S.C.
	ANALYSES PERFORMED BY	S	" " "
	MANUFACTURE AND DISTRIBUTE BEER		
OTHER	400 EMPLOYEES		
	FINAL EFFLUENT APPEARENCE	N.I.	
	REC. WATERS APPEARENCE	N.I.	

LPRSA0042820

N.J.D.E.P.
D.W.R.
DISCHARGE SURVEILLANCE REPORT

Permit #: NJ0028088
Date: 4/3/85

PLANT DIAGRAM AND FLOW SEQUENCE:



NOTE DISCHARGE 002 SAMPLED DAILY BY P.V.S.C. AND PABST BREWING COMPANY

— NO SAMPLES TAKEN —

SAMPLING PERIOD: ______ COMPOSITE INTERVAL: ______

DISCHG	PARA	SAMPLE TYPE	PERMIT LIMITS	SAMPLE RESULT	DISCHG	PARA	SAMPLE TYPE	PERMIT LIMITS	SAMPLE RESULT
002	BOD								
"	TSS								
"	pH								
"	Flow								

Form VST-001
7/81

STATE OF NEW JERSEY
Department of Environmental Protection
Water Analysis

PLEASE TYPE OR PRINT WITH BALLPOINT PEN

MUNICIPALITY Newark	COUNTY Essex	STREAM Maybaum Creek
FACILITY Pabst Brewing Co.	LOCATION 400 Grove ST.	
REPRESENTATIVE M. Engleman	TITLE Plant Engineer	NAME Weinman/White
REMARKS 001		221 IQD

CHAIN OF CUSTODY

BACT. LAB NO.
DATE REC'D
BOTTLE NO. 26093
DATE REC'D
STORET ENT. READ.

Station Identification Number: S C , | YR MO DAY: 8 5 04 03 | HOUR: 1030 | Sample No.: PF 26093

FIELD ANALYSIS

X Water Temp. °C	(2) P00010	28 C
D.O. Winkler	(3) P00300	
D.O. Probe	(4) P00299	
pH (Field)	(5) P00400	
Sample Depth-ft.	(6) P00003	
Stream Flow-CFS	(7) P00061	
Gage Height-ft.	(8) P00065	
Spec. Cond. @ 25°C	(9) P00095	
Salinity 0/00	(10) P00480	
Tide Stage	(11) P70211	

CONDITION CODES

Weather Conditions	(12) P00041	
Flow Severity	(13) P01351	
______ Severity	(14) P013__	
______ Severity	(15) P013__	

NUTRIENTS

LEVEL ☐ HIGH ☐ LOW

NO_2 - N	(16) P00615	
$NO_2 + NO_3$ N	(17) P00630	
NH_3 - N	(18) P00610	
Tot. Kjeldahl N	(19) P00625	
Ortho PO_4 as P / PO_4	(20) P70507 / (21) P00660	
Phosphorus tot as P / PO_4	(22) P00665 / (23) P00650	

BACTERIOLOGICAL – DILUTIONS (REQUESTED)

Fecal Coliform
Total Coliform
Fecal Streptococci

Fecal coli #100 ml	☐ MPN (24) P31615 / ☐ MF (25) P31613	
Fecal Strept MPN 100ml	(26) P31677	
Tot coli MPN/100 ml	(27) P31505	

BIOCHEMICAL OXYGEN DEMAND

INITIAL D.O. (TBD) SAMPLE

SEED YES NO

CONC.

BOD

BOD	5-DAY (28) P310 / 6-DAY (29) P313	

X COD	(30) P340	36
TOC	(31) P00680	

Color Pt-Co	(32) P00080	
Turbidity	(33) P00076	
X Suspended Solids	(34) P00530	3
Suspended Solids Ash	(35) P00540	
Tot Solids	(36) P00500	
Tot Solids Ash	(37) P00510	
Tot Dissolved Solids (TDS)	(38) P70300	

X pH (LAB)	(39) P00403	8.0
Alkalinity as $CaCO_3$	(40) P00410	
Min. Acidity as $CaCO_3$	(41) P00435	
X Chloride	(42) P00940	104
MBAS	(43) P38260	
Phenols	(44) P32730	
Hardness tot as $CaCO_3$	(45) P00900	
Sulfate	(46) P00945	
Oil & Grease	(47) P00556	
X Petroleum Hydrocarbons	(48) P45501	1.3
Cyanide	(49) P00720	
As - tot ug/l	(50) P01002	
Cd - tot ug/l	(51) P01027	
X Cr - tot ug/l	(52) P01034	7
X Cu - tot ug/l	(53) P01042	354
Fe - tot ug/l	(54) P01045	
Hg - tot ug/l	(55) P71900	
Mn - tot ug/l	(56) P01055	
Ni - tot ug/l	(57) P01067	
Pb - tot ug/l		
X Zn - tot		5

RECEIVED
MAY 07 1985
DEPT. ENVIRONMENTAL PROTECTION
NEWARK OFFICE

REPORT SUBMITTED
APR 30 1985
NJDOH Environmental Chemistry Laboratory

RESULTS mg/l unless otherwise noted

Chemist Review ______________

Part 1 (White) - Water Quality Inventory Copy
Part 2 (Canary) - Laboratory Copy
Part 3 (Pink) - Laboratory Copy
Part 4 (Goldenrod) - Field Sample Copy

LPRSA0042822

Form DEP-009
1/81

4

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
TRENTON, NEW JERSEY 08625

CHAIN OF CUSTODY RECORD

NAME OF UNIT AND ADDRESS: NJDEP
1100 Raymond Blvd Room 510
Newark, NJ

SAMPLE NUMBER	Number of Containers	DESCRIPTION OF SAMPLES
26093	1	250ml pH
"	1	500ml COD
"	1	500ml Gen. Chem (TSS, chloride)
"	1	1000ml Petro Hydro
"	1	1000ml Metals (Cr, Cu, Zn)

RECEIVED
DIVISION OF WATER RESOURCES
ENFORCEMENT ELEMENT
MAY 6 8 33 AM '85

Pabst Brewing Co
400 Grove St
Newark, NJ

PERSON ASSUMING RESPONSIBILITY FOR SAMPLE: Loretta Weinman

TIME: 10:30

SAMPLE NUMBER	RELINQUISHED BY:	RECEIVED BY:	TIME	DATE	REASON FOR CHANGE OF CUSTODY
26093	L. Weinman	M. Zack	1:35	4/3/85	Transport to DOH lab
	M. Zack	A. Ward	3:20	4/3/85	DOH RECEIVING AREA
26093	A. Ward	R. Johnson	9:40	4/4/85	Pet Hydrocarbon
"	Emma R Cafe	A. De Tollo	9:15	4/8/85	COD
"	A. Ward	E. Olsen	12:00	4/9/85	Chlorides
"	Emma R Cafe	Nancy Mann	10:15	4/10/85	SS
"	Jean Deliberty	[illegible]	0900	[illegible]	Cu, Cr, Zn
"	A. Ward	A. Ward	4:30	4/3/85	PH

RECEIVED
MAY 07 1985
DEPT. ENVIRONMENTAL PROTECTION
NEWARK OFFICE

REPORT SUBMITTED
APR 30 1985
NJDOH Environmental
Chemistry Laboratory

LPRSA0042823

white RW

FILE

RECEIVED
WATER RESOURCES
ELEMENT
3 AM '85

PABST BREWING COMPANY

400 GROVE STREET • NEWARK, NJ 07106 (201) 373-6000 TWX #710-995-4467

March 4, 1985

NJ DEP - Division of Water Resources
P.O. Box CN-029
Trenton, NJ 08625

Attention: Bureau of Permits Administration

Re: NPDES Permit No. NJ0028088

Gentlemen:

We have reported to you the details of our analysis in the Quarterly Sewer Monitoring Report. The most recent one for the period 11/1/84 to 1/31/85 has an attachment which shows a level of hydrocarbons above the permit level. When we received this Report from the Lab, we immediately took samples of our water, both from the well and from the discharge of the Plant. We sent these out for analysis, and the results came back within permit limits.

We have reported all of this information because we do believe that we have an obligation to maintain the standards of our effluent, and as such we are concerned. It is our belief that the high level was not representative of our normal effluent quality. There are number of possible explanations which might explain why it happened, but they are all speculation. Rather than guess, we are watching the water quality and sampling on an increased basis to insure ourselves that we are not having a problem.

If I can be of further assistance, please let me know.

Very truly yours,

Michael P. Engleman

Michael P. Engleman
Plant Engineer

MPE:lr
Attachment

RECEIVED

MAR 15 1985

DEPT. ENVIRONMENTAL ...
NEWARK OFFICE

Sedlak
Accept
cc. Perrapato

Passaic Valley
Sewerage Commissioners

600 WILSON AVENUE
NEWARK, N. J. 07105
(201) 344-1800

June 17, 1985

Pabst Brewing Company
400 Grove Street
Newark, NJ 07106

ATTN: Michael P. Engleman, Plant Engineer

RE: DISCHARGE OF AMMONIA AND PROCESS MATERIAL

Dear Mr. Engleman;

This letter is in reference to your June 11, 1985 letter requesting permission from PVSC to discharge about 8,000 lbs. anhydrous ammonia and less than 2,000,000 gal of process material. This letter will serve to confirm the conditions that must be followed in order for PVSC to permit the discharge.

The discharge must comply with the PVSC Rules and Regulations and the following:
(a) Adjust the rate of discharge to prevent surcharging and overflow of liquid or foam;
(b) maintain the pH of the discharge between 5 and 10.5;
(c) space out the discharge of ammonia over the seven day period;
(d) use sufficient dilution water to minimize ammonia odors;
(e) within 14 days after the discharge is complete, submit a written report to PVSC detailing exactly how many gallons of material were discharged. PVSC will assess a user charge for this material which will be added to the normal user charge to be paid by Pabst; and
(f) all other PVSC Rules and Regulations must be followed as well as other applicable federal, state or local laws and regulations.

Please confirm your acceptance of these condtions.

Very truly yours,

PASSAIC VALLEY SEWERAGE COMMISSIONERS

Frank P. D'Ascensio
Frank P. D'Ascensio
Superintendent of Industrial Waste

FPD/cc

RECEIVED

JUN 19 1985

DEPT. ENVIRONMENTAL PROTECTION
NEWARK OFFICE

cc: Carmine T. Perrapato, Executive Director
Douglas Borgatti
Steven Sedlak, NJDEP
Al Zach, City of Newark
Lawrence A, Dillon, Bureau ATF

LPRSA0042825

...n for the presidency, is ...arade barricades from ...l putting together a 100-offi- ...gent from off-duty policemen ...ficers from the Essex County Po- ...e and Sheriff's Office.

"We're going to have every avail- ...le man who can walk or crawl" to ...otect the President during the 15- ...inute noon-hour address, Castagno ...id.

Reagan is scheduled to arrive at ...wark International Airport about ...:30 a.m. tomorrow, be driven to ...omfield in a motorcade and return ...mediately to Washington after the ...eech. Municipal Plaza will be closed ...lay, and will be reopened tomorrow ...10 a.m. as "President Reagan ...uare" in honor of the municipality's ...st presidential visit.

Mayor John Kinder said the town ...l will be cleaned tonight and dogs ...l be brought in to sniff for anything ...usual. In addition, metal detectors ...l be set up at the three public en- ...nces to the plaza which, along with a ...king lot across the street, is the size ...wo football fields.

Among others expected tomorrow ...l be "opponents of President Rea- ...'s Central America policies" who ...l "hold a series of events" beginning ...ay to mark the presidential visit, ac- ...ding to the Committee for a Sane

Please turn to Page 10

Photo by Jennifer Lawson

Riccardo Melsi of Bloomfield displays the four-foot eagle he carved for Reagan's visit

Pabst to shut plant and dump its beer

By DONALD WARSHAW

The Pabst Brewing Co. moved yesterday to close its plant in Newark, after efforts failed to get satisfactory labor agreements with Teamsters and craft unions covering more than 400 employes at the facility.

The company contacted the Passaic Valley Sewerage Commission (PVSC) for permission to dump today 2 million gallons of beer in its brewing tanks, as well as ammonia which is used as a refrigerant in the brewing process.

Pabst laid off all its Teamsters workers and most craft union employes Friday, and rejected an "or else" demand from Operating Engineers Local 68 for a one-year extension of the present contract covering its 18 workers at the plant.

Local 68 acted after what business manager Vincent Giblin charged was the failure by Pabst to honor an agreement to begin talks on a new pact last week under a 60-day extension of the contract which terminated May 31.

Frank D'Ascensio, superintendant of industrial waste control at the PVSC, said Pabst followed up an oral request to dump the beer and ammonia with a written request received yesterday.

"We'll be at the plant tomorrow morning (today) making observations and setting conditions they (Pabst) have to meet to discharge. If all conditions are met, dumping could conceivably start" today, he said.

Dumping the beer would destroy the "yeast culture" required for brewing, while evacuating the ammonia would result in the rusting of containment pipes requiring a replacement of the system in order to reopen the plant, union officials said.

While Pabst moved to dump beer brewing in its huge tanks at the plant on the Irvington border, Teamsters representatives made a last ditch effort to restart talks on a new contract.

The Teamsters sent a telegram to 82-year-old California brewing magnate Paul Kalmanovitz, whose S&P Co. bought a controlling interest in Pabst in

Please turn to Page 12

Photo by Vic Yepello

...bridge Township Public Works Department Administrative Analyst ...en A. Mikulak inspects a five-gallon container filled with syringes found along the Sewaren peninsula beach

THE STAR LEDGER JUNE 12, 1985

Let's protect our earth

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION

NOTICE OF AUTHORIZATION

IO.	ISSUANCE DATE	EFFECTIVE DATE	EXPIRATION DATE
088	11-30-82	2-1-83	10-29-86

O	FOR ACTIVITY/FACILITY AT	OWNER
rewing Company ve Street New Jersey 07106	Same as applicant	Pabst Brewing Company 917 West Juneau Avenue Milwaukee, Wisconsin 53201

IVISION	TYPE OF PERMIT	STATUTE(S)	APPLICATION NO.
ater Resources astal Resources ivironmental Quality	N.J. Pollutant Discharge Elimination System (NJPDES) permit SIU Indirect Discharge	N.J.S.A. 58:10A-1 et seq.	N/A

T TO

Discharge the wastewater generated at Pabst Brewing Company, Newark, in the preparation of malt beverages into the Passaic Valley Sewerage Commissioners treatment plant in conformance with the effluent limits and monitoring requirements as stated in Part III Table I and subject to additional conditions and other requirements in Parts II and III.

DEP AUTHORIZATION

.008

THIS NOTICE MUST BE CONSPICUOUSLY DISPLAYED AT THE ACTIVITY/FACILITY SITE.

Let's protect our earth

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
CN 402
Trenton, N. J. 08625

PERMIT *

The New Jersey Department of Environmental Protection grants this permit in accordance with your application, attachments accompanying same application, and applicable laws and regulations. This permit is also subject to the further conditions and stipulations enumerated in the supporting documents which are agreed to by the permittee upon acceptance of the permit.

Permit No.	Issuance Date	Effective Date	Expiration Date
NJ 0028088	11-30-82	2-1-83	10-29-86

Name and Address of Applicant	Location of Activity/Facility	Name and Address of Owner
Pabst Brewing Company 400 Grove Street Newark, New Jersey 07106	Same as applicant	Pabst Brewing Company 917 West Juneau Avenue Milwaukee, Wisconsin 53201

Issuing Division	Type of Permit	Statute(s)	Application No.
☒ Water Resources ☐ Coastal Resources ☐ Environmental Quality ☐ Other	N.J. Pollutant Discharge Elimination System (NJPDES) permit SIU Indirect Discharge	N.J.S.A. 58:10A-1 et seq.	N/A

This permit grants permission to:

Discharge the wastewater generated at Pabst Brewing Company, Newark, in the preparation of malt beverages into the Passaic Valley Sewerage Commissioners treatment plant in conformance with the effluent limits and monitoring requirements as stated in Part III Table I and subject to additional conditions and other requirements in Parts II and III.

Approved by the Department of Environmental Protection

Arnold Schiffman
Administrator
Water Quality Management

11/30/82
DATE

* The word permit means "approval, certification, registration, etc."

(GENERAL CONDITIONS ARE ON THE REVERSE SIDE.)

DEP-007

FACILITY NAME: PABST BREWING CO.

TOWNSHIP/CO.: NEWARK

NJPDES NUMBER: NJ0028088

DATE(YY TO YY): 1984-86

DESCRIPTION: CORRES

Susan

Let's protect our earth

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATER RESOURCES
CN 029
TRENTON, NEW JERSEY 08625

GEORGE G. McCANN, P.E.
DIRECTOR

WATER QUALITY MANAGEMENT

DIRK C. HOFMAN, P.E.
DEPUTY DIRECTOR

Pabst Brewing Co.
400 Grove Street
Newark, NJ 07106
ATTN: Michael Engleman

DEC 05 1986

RECEIVED
DEC 05 1986
STATE OF NEW JERSEY
DEPT. ENVIRONMENTAL PROTE
DIVISION WATER RESOUR

Dear Mr. Engleman:

RE: NJPDES Permit No. NJ0028088
Facility: Pabst Brewing Co.
Municipality: Newark
County: Essex
Discharge Activities: Industrial Discharge to Surface W
Indirect Discharge to POTW(SIU)
Categories: B and L

This letter is to confirm that the Department is in receipt of your Affidavit of Exemption from the New Jersey Pollutant Discharge Elimination System notarized on October 9, 1986. Please be advised that the referenced permit has been terminated for Surface Water Discharge and as a Significant Industrial User.

Sincerely,

Sharon Trusdale

Sharon Trusdale
Administrative Reviewer
Bureau of Permits Administration
Water Quality Management

WQM144

c: Enforcement-Metro Region
Bureau of Industrial Waste Management
bcc: Central File
Chron
Pip File
Sharon

NEW JERSEY STATE DEPARTMENT OF ENVIRONMENTAL PROTECTION
Division of Water Resources
Water Quality Management Element

MEMORANDUM

TO: Sharon Trusdale, Bureau of Permits Administration

FROM: Susan Helms through Flavian Stellerine,
Bureau of Industrial Waste Management

SUBJECT: Affidavit of Exemption - Pabst Brewing Co. NJ0028088

DATE: November 5, 1986

This is a verification of an Affidavit of Exemption from Pabst Brewing Co., NJPDES No. NJ0028088. The facility was visited on October 23, 1986 by the writer and it was confirmed that any discharge has ceased. If you have any questions, please contact Susan Helms at 292-0407.

WQM232

RECEIVED
NOV 6 1986
DEPT. ENVIRON. PROTECTION
Division Water Resources
Bureau of Permits Admin.

ADM-012

Susan Hlavac - C.R. 11/2

MEMO

NEW JERSEY STATE DEPARTMENT OF ENVIRONMENTAL PROTECTION

TO Highlighted Name Below

FROM Sharon Truesdale, Bureau of Permits Administration DATE OCT 15 1986

SUBJECT Affidavit of Exemption

Attached is a copy of an Affidavit of Exemption from the NJPDES permit program that has recently been submitted to the Bureau of Permits Administration. Please contact BPA as soon as possible if you have any disagreement as to the content and/or intent of the proposed exemption. Any disagreement on the proposed exemption by the appropriate technical reviewer will require that reviewer to notify the permittee of the Department's position in addition to providing notification to BPA. If the reviewer has no objections to the proposed exemption please provide BPA a memo documenting your agreement. This memo of agreement will signal BPA to inactivate the project activity codes corresponding to the discharge category(ies) specified in the Affidavit.

WQM202:gk

Attachment

RECEIVED
OCT 15 1986
STATE OF NEW JERSEY
DEPT. ENVIRONMENTAL PROTECTION
DIVISION WATER RESOURCES
BUR. OF IND. WASTE MGMT.

Enforcement, Central Region
Enforcement, Metro Region
Enforcement, Northern Region
Enforcement, Southern Region
Bureau of Industrial Waste Management
Bureau of Municipal Waste Management
Bureau of Ground Water Quality Management

Affidavit of Exemption
from the
New Jersey Pollutant
Discharge Elimination System Permit
NJPDES #

State of New Jersey)ss:
County of Essex)
I, Michael Engleman, being sworn, states:

1. I am * Plant Engineer
(Title and Position)

of Pabst Brewing Company
(Name of Company)

2. I have personal knowledge of the facts set forth herein.

3. NJPDES Permit No. 0028088, issued on July 24, 1981 authorized the following "discharge" of "pollutants" to the waters of the State of New Jersey from 400 Grove St, Nwk. or operation of The Pabst Brewing Co. (plant or facility) such facility. (Check appropriate type of discharge(s)).

___ Surface water/Municipal
X Surface water/Industrial
___ Surface water/Thermal
___ Land application of sludge & septage
___ Land application/Industrial Waste residue
___ Landfill - Industrial/Commercial
___ Landfill - Municipal
___ Spray Irrigation - Industrial/Commercial
___ Spray Irrigation/Domestic
___ Overland Flow - Industrial/Commercial
___ Rapid Infiltration - Industrial/Commercial
___ Rapid Infiltration
___ Surface Impoundment - Industrial/Commercial
___ Surface Impoundment/Domestic
___ Underground Injection - Industrial/Commercial
___ Underground Injection/Domestic
X Significant Industrial User
___ Individual Subsurface Sewage Disposal - Industrial/Commercial
___ Individual Subsurface Sewage Disposal - Community
___ Overland Flow/Domestic
___ Rapid Infiltration
___ Surface Impoundment/Domestic
___ Underground Injection/Domestic

Other - Describe ______________________________

These terms are as defined in Section 3 of the New Jersey "Water Pollution Control Act" N.J.S.A. 58:10A-1 et seq. and the New Jersey Pollutant Discharge Elimination System Regulations, N.J.A.C 7:14A-1 et seq.

* Signatory must be the person responsible under N.J.A.C. 7:14A-2.4(b).

4. This Plant is no longer discharging pollutants to the waters of the State as described in No. 3 above.

5. This Plant is no longer discharging wastes because of the following:

X Facility has been closed
___ Connection to severage authority
___ In-plant recycling
___ Other - describe ____________________

6. I understand that NJPDES permit fees are payable until the date the Department receives this affidavit.

7. I understand that it is a violation of the "Water Pollution Control Act" N.J.S.A. 58:10A-1 et seq. to discharge pollutants except in conformity with a NJPDES permit and that I may be subject to significant civil/criminal penalties for said violation.

Michael Engleman
(Signature)

Michael Engleman
(Type Name)

Sworn to and signed in my presence this 9 day of Oct., 1986.

(Signature)
DIANE J. ROUSE
NOTARY PUBLIC OF NEW JERSEY
(Seal)
My Commission Expires Apr. 26, 1988

Notary Public in and for the County of Essex, State of New Jersey

BE ON NOTICE THAT any person who knowingly makes a false statement, representation, or certification in any application, record, or other document filed or required to be maintained under the Water Pollution Control Act... shall, upon conviction, be subject to a fine of not more than $10,000.00 or by imprisonment for not more than 6 months, or both.

A copy of this affadavit shall be kept on the premises and be available for inspection by the Department.

WQM7-N/L:lml

PABST BREWING COMPANY

400 GROVE STREET • NEWARK, NJ 07106 (201) 373-6000 TWX #710-995-4467

2808

September 19, 1986

Ms. Florence Power
Administrative Analyst I
Bureau of Permits Administration
Water Quality Management
Department of Environmental Protection
CN 029
Trenton, NJ 08625

Dear Ms. Power:

Enclosed is a copy of a transmittal sent to us by your office. It relates to our former NJPDES permit. This permit was cancelled in June of 1986. I am enclosing a copy of the letter from DEP to Pabst Brewing confirming this. It appears that our permit information is still in your computer.

Please clear your computers memory or let me know if I am incorrect in believing that we no longer need be sent these communications.

Thank you for your assistance.

Yours truly,

PABST BREWING COMPANY

Michael Engleman
Plant Engineer

Pabst Blue Ribbon Hamm's Beer Olympia Beer Olde English 800

Let's protect our earth

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATER RESOURCES
CN 029
TRENTON, NEW JERSEY 08625

GEORGE G. McCANN, P.E.
DIRECTOR

DIRK C. HOFMAN, P.E.
DEPUTY DIRECTOR

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Pabst Brewing Co.
400 Grove Street
Newark, NJ 07106

JUN 24 1986

RE: NJPDES Permit Expiration
NJPDES Permit No. NJ0028088
Category B

Dear Permittee:

Our records indicate that your New Jersey Pollutant Discharge Elimination System Permit No. NJ0028088 for Category B, expires on 10/29/86. In order to renew your permit, please complete and return the enclosed permit application forms to this Bureau before August 31, 1986. If you fail to submit your application by this date you will be in violation of the New Jersey Water Pollution Control Act, N.J.S.A. 58:10A-7(A) and the New Jersey Pollution Discharge Elimination System Regulations, N.J.A.C. 7:14A-2.1(F)5 and subject to the following penalties:

The penalties which may be assessed for time related non-discharge violations shall be as follows:

1. Basic penalty up to a maximum of $5,000.00:
   i. One to three days late: No penalty;
   ii. Four to ten days late: $10.00/day;
   iii. Eleven to twenty days late: $25.00/day;
   iv. More than 20 days late: $100.00/day.

2. Daily fine: After receipt of an order from the Department commanding submission of the required report by a specified deadline, the daily fine shall be:
   i. During first week after deadline: $100/day;
   ii. During second week after deadline: $200/day;
   iii. During third week after deadline and subsequently: $500/day.

If you no longer have a discharge and no longer require a NJPDES permit, please notify this Bureau as soon as possible to terminate your permit. Until proper termination has been completed, you are responsible for the permit and for payment of the annual NJPDES permit fee.

Be on notice that the discharge of pollutants without a valid permit constitutes a violation the New Jersey Water Pollution Control Act N.J.S.A. 58:10A-1 et seq. and the Federal Clean Water Act. If your application is submitted by the above date, your present permit will remain in effect until a final determination is made on your renewal application. If you fail to submit a renewal application your permit will become invalid on the date of expiration. You will be subject to additional penalties for discharging without a valid permit.

Thank you for your cooperation and your interest in protecting the environment. If you have any questions you may contact me at (609) 984-4428.

Sincerely,

Nat Cooperman

Nat Cooperman
Supervising Environmental Engineer
Bureau of Permits Administration
Water Quality Management

WQM13-DD/RR1:jat

Enclosures

WQME: NJPDES Permit No. NJ0028088

Enforcement: Central Region

Bureau of: Industrial Waste Management

bcc: Central File

NJ00 28088-01

INDUSTRIAL WASTE MANAGEMENT FACILITY (IWMF) WORKSHEET

1. Name: PABST BREWING COMPANY
Mailing Address: 400 GROVE ST. NEWARK, N.J. 07106
Location Address: " " " " "
Facility Contact: MICHAEL ENGLEMAN
Telephone No.: (201) 373-6000 RCRA ID No.: NJD002447449
Facility NJPDES No.: NJ0028088 Type: X DSW ___ DGW X SIU ___ None
Receiving POTW, if any: PVSC POTW NJPDES No. NJ0021016

2. Description of Waste Source(s): ______

3. The Waste Source is:

___ Intracompany/Intrastate ___ Intercompany/Intrastate

4. Operational Units comprising the treatment works (describe):

Unit #1:
Unit #2:
Unit #3:
Unit #4: THE PRODUCTION OPERATIONS
Unit #5:
Unit #6: are CLOSED (TERMINATED).
Unit #7:
Unit #8:

5. Criteria (For each item indicate Yes, No, N/A, etc.):

a. Is there an influent wastewater? NO
Is it hazardous? N/A
If yes, list waste type. N/A

b. Does the treatment works generate (G), store (S), or treat (T) a wastewater treatment sludge or residue? N/A
If yes, which units are involved, and what function do they perform? N/A
Is it hazardous? N/A
If yes, list waste type(s): N/A

c. Is the unit a "tank" as per NJAC 7:14A-4.3? N/A

6. Conclusions: Is the facility an IWMF? N/A

7. Comments: ______

LPRSA0042838

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATER RESOURCES
CN 029
TRENTON, NEW JERSEY 08625

George G. McCann, P.E.
Acting Director

DIRK C. HOFMAN, P.E.
DEPUTY DIRECTOR

Water Quality Management

Central File

Pabst Brewing Company — NJ0003808
400 Grove St.
Newark, NJ 07106

APR 30 1986

Re: Reapplication or Exemption

Dear Sir:

The NJPDES-SIU permit allowing discharge from your facility to sanitary sewers will expire on October 29, 1986. The permit requires submission of an application for renewal 180 days prior to the expiration date, if discharge is to continue.

I understand that production at the facility is closed down, but that you may wish to keep the permit active in anticipation of future activity on site. However, you should understand that an active permit is transferable only if the character and quantity of wastes generated by any new operating company closely approximates your own.

Also, Passaic Valley Sewerage Commission is a "designated sewerage authority", authorized to write sewer use permits on industrial users discharging less than 500,000 gallons daily, with certain exceptions.

Please note that your decision to terminate the permit by filing the enclosed Affidavit of Exemption or to renew by filing the other enclosed forms does not effect current permit fee billing, which is based on your previous activity on the site, but will effect future billing and activi

Also, you are required to file quarterly reports (indicating "ZERO DISCHARGE", if applicable) until the permit is terminated by filing of the Affidavit or by notice from the Division. Note that for this purpose, discharge of domestic sanitary wastes only may be considered as zero discharge. Failure to submit a quarterly report is a violation of the existing permit.

If you have questions regarding this action, please call me at (609) 292-0407.

Sincerely,

Gary Torres

Gary Torres
Environmental Engineer
Bureau of Industrial Waste Management

WQM181:gjt

New Jersey Is An Equal Opportunity Employer

NJ28088

PABST BREWING COMPANY

400 GROVE STREET • NEWARK, NJ 07106 (201) 373-6000 TWX #710-995-4467

April 23, 1986

Pretreatment Section
Division of Water Resources
CN 029
Trenton, NJ 08625

Dear Sirs:

This letter is a response to your telephone call to our office on April 23, 1986. The Pabst Brewing Company's Newark facility has been shut down since June 7, 1985 At that time all production ceased, with the only activity being cleanup. Within the couple of months following the shutdown we dumped the remaining beer into the sewer. Since that time the activity at the Plant has been only sanitary sewer for domestic waste.

The staffing has been 4 office workers on the day shift and a guard force which works around the clock. This amounts to 3 men per shift, 7 days a week. The usage is water fountains, sinks, and toilets: ie. minimum usage.

The quantity of beer dumped at shutdown was 1,302,000 gallons.

If I can be of further assistance, please let me know.

Yours truly,

Michael Engleman

Michael Engleman
Plant Engineer

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WASTE MANAGEMENT
32 E. Hanover St., CN 028, Trenton, N.J. 08625

DR. MARWAN M. SADAT, P.E.
DIRECTOR

LINO F. PEREIRA, P.E.
DEPUTY DIRECTOR

01 FEB 1985

RECEIVED
FEB 4 1985
STATE OF NEW JERSEY
DEPT. ENVIRONMENTAL PROTECTION
DIVISION WATER RESOURCES

John C. Ehmann, General Plant Manager
Pabst Brewing Company
400 Grove Street
Newark, NJ 07106

RE: Pabst Newark Facility Status
EPA ID NO. NJD 002 447 449

Dear Mr. Ehmann:

This will acknowledge and respond to your written December 14, 1984 request to have TSDF interim status delisted for the above referenced facility. Additionally, this will acknowledge receipt of Pabst's January 9, 1985 Annual Report for 1984.

The Bureau has reviewed your company's request through a records search and past correspondence review and finds the request approvable in light of the following information.

The S01 (container storage) capacity of 5,500 gallons filed for in the Part A dated November 14, 1984 was a protective measure which, to date, has not materialized as evidenced by annual TSD reports for 1982, 1983, and 1984 showing no activity in this storage aspect of the facility. Recent (December 14, 1984) correspondence indicates you do not anticipate a change in the future.

The T04 (treatment other) capacity of 1,000 gallons per day related to the cleaning processes which are utilized at Pabst Newark to clean brewing vessels and returnable bottles using a caustic soda solution which, when no longer usable, is directly discharged to the sanitary sewer (Passaic Valley, POTW) along with other plant sewage with base line effluent approval by the Passaic Valley Authority.

A → The Bureau interprets the cleaning procedures as functions associated with normal processing operations with the residues (rinses, etc.) being directly discharged as reported with no pretreatment.

If any of the foregoing is incorrect, please advise this Bureau immediately in writing.

New Jersey Is An Equal Opportunity Employer

LPRSA0042841

RCRA INSPECTION REVIEW SH[illegible]

Name of Facility - Pabst Brewing Co
RCRA ID# - NJD002447449
Date of Inspection - 7-3-81
Type of Inspection: Generator Transporter TSD
Name of EPA/State Inspector -

Findings of Inspection: Plant uses caustic to clean re-cycled beer bottles - the pulp + caustic/water is [illegible]

[illegible] indicating hazardous waste exist. Mr Blau was advised

Action(s) Taken: to withdraw Transporter & TSD status and maintain gen. status in the event it is needed.

Action(s) Recommended: NONE

	YES	NO	DON'T KNOW
b. Is there reason to believe that there are hazardous wastes on-site which the company claims are merely products or raw materials?		X	

Please explain:

c. Identity the hazardous wastes that are on-site, and estimate approximate quantities of each.

d. Describe the activities that result in the generation of hazardous waste.

cleaning recycled beer bottles

	YES	NO	DON'T KNOW
(2) Is hazardous waste stored on site?		X	
a. What is the longest period that it has been accumulated?			
b. Is the date when drums were placed in storage marked on each drum?		N/A	
(3) Has hazardous waste been shipped from this facility since November 19, 1980?		X	
a. If "yes," approximately how many shipments were made?			
(4) Approximately how many hazardous waste shipments off site have been made since November 19, 1980?			
a. Does it appear from the available information that there is a manifest copy available for each hazardous waste shipment that has been made?			

b. If "no" or "don't know," please elaborate.

3/02/83 HWDMS MASTER FACILITY LISTING PAGE

REGION: 02 STATE: NJ NJD002447449 PABST BREWING COMPANY LAST UPDATE: 2/11/83

400 GROVE STREET

EXISTANCE DATE: 7/01/65 NEWARK NJ 07106 CLOSURE DATE:

201/373/6000

COUNTY: ESSEX 013 DISTRICT: BASIN: LATITUDE: 404435.0 LONGITUDE: 074122

FACILITY STATUS: 1 MODIFY/CONSTRUCT: COMMERCIAL: NON-REGULATED: OWNER TYPE: P FACILITY TYPE: GEN TRANS TSDF

MAILING ADDRESS	OWNER ADDRESS	OPERATOR ADDRESS
BLAIR HOWARD PLANT ENGINEER	PABST BREWING COMPANY	PABST BREWING COMPANY
400 GROVE STREET	917 WEST JUNEAU AVENUE	917 WEST JUNEAU AVENUE
NEWARK NJ 07106	MILWAUKEE WI 53201	MILWAUKEE WI 5
	414/347-7300	414/347-7300

INDICATORS

CONFIDENTIALITY NOTIF : 0
CONFIDENTIALITY PART A : 0
NATURE BUSINESS IND : A
MAP STATUS IND : A
DRAWING STATUS IND : A
PHOTO STATUS IND : A
INDIAN LAND IND : N
OWNER/OPERATOR IND : Y

NOTIFICATION DATA

PERMIT STATUS: 1
NOTIFICATION RECEIVED: 8/18/80
NOTIFICATION ACKNOWLEDGED: 10/09/80
PART A RECEIVED: 11/19/80
(1) PART A ACKNOWLEDGED: 1/15/81
(2) PART A ACKNOWLEDGED:

PERMITS

TYPE	NUMBER
Y	05008
N	NJ0028088

DESIGN CAPACIT

PROCESS	AMOUNT
T04	1000.(
S01	5500.(

SIC CODES

2082

TRANSPORTATION

ROAD

WASTE DESCRIPTION

ASTE CODE: D001 ESTIMATED AMOUNT: 1.360 MT PROCESSES: S01
ASTE CODE: D002 ESTIMATED AMOUNT: 90.720 MT PROCESSES: S01 T04

COMMENTS

157 820310 10.22862 W
GEN

LPRSA0042844

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
HAZARDOUS WASTE FACILITY ANNUAL REPORT - PART I

1. CALENDAR YEAR COVERED 1984

2. FACILITY'S NAME Pabst Brewing Company

3. EPA ID NO. F NJD 002447449 D

4. MAILING ADDRESS 400 Grove Street
Newark, NJ 07106

5. STREET ADDRESS OF FACILITY Same

6. FACILITY CONTACT Michael P. Engleman PHONE NUMBER (201) 3?3-6000

7. CLOSURE COST ESTIMATE $ - 0 -

8. POST-CLOSURE COST ESTIMATE (if applicable) $ - 0 - (Copy of Insurance Coverage is attached)

9. CERTIFICATION STATEMENT

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties under N.J.S.A. 13:1E-1 et seq. for submitting false information, including the possibility of fine and imprisonment".

John C. Ehmann	John C. Ehmann	1/7/85
Print or Type Name	Signature	Date

10. In addition to the information required above and that required in Part II of this report, please submit the following required items: (where applicable)

A. A copy of the facility's typical waste analysis form.
B. A copy of the facility's typical daily inspection form.
C. A copy of the typical notice to a generator, required under N.J.A.C. 7:26-9.4(a)1 and a listing of all generators who receive this notice (only for commercial facilities).
D. A listing of all waste shipments rejected, according to manifest number and an explanation for each rejected shipment (only for commercial facilities).
E. A listing of all manifest discrepancies and an explanation of each discrepancy (only for commercial facilities).
F. A listing of the total quantity of each waste type treated, stored, or disposed of at the facility. This listing shall include all hazardous waste accepted at the hazardous waste facility, including all on-site generated waste.
G. A listing of the total quantities of each waste type consigned to each treatment, storage, or disposal process used at the facility. This listing shall include all on-site generated hazardous waste.
H. A report covering all incidents that required implementing the contingency plan.

10.

A. We did not function as a TSD Facility during 1984, and therefore have no waste analysis form.

B. As there was no function as a TSD there is no monitoring data.

C. Since we do not function as a TSD, we do not submit such notice to generators.

D. Not applicable.

E. Not applicable.

F. Not applicable.

G. Not applicable.

H. There was no incidents requiring implementing the contingency plan.

NOTE: We have requested tnat our Facility be delisted as a TSD Facility. A copy of the request is attached.

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
HAZARDOUS WASTE FACILITY ANNUAL REPORT - PART II

11. FACILITY EPA ID # F NJD 002447449 D

12. GENERATOR NAME Pabst Brewing Company

13. GENERATOR ADDRESS 400 Grove Street
Newark
New Jersey, 07106

14. GENERATOR EPA ID # ______

15. WASTE IDENTIFICATION

a) NJDEP HAZARDOUS WASTE NUMBER	b) AMOUNT OF WASTE	c) UNITS	d) DESCRIPTION OF WASTE	e) HANDLING METHOD	f) MOS

This Facility did not function as a TSD Facility during 1984.

We did not treat or store waste material.

We did not accept waste material from others, nor did we ship any.

All waste generated on site was direct discharged to the sanitary sewer without treatment or dilution.

PABST BREWING COMPANY

400 GROVE STREET, NEWARK, NEW JERSEY 07106 (201) 371-6000

December 14, 1984

Mr. Frank Coolick, Chief
Bureau of Hazardous Waste Engineering
32 East Hanover Street
Trenton, NJ 08625

Dear Mr. Coolick:

Our Facility is listed as having T.S.D. Interim Status. (E.P.A. I.D. No. N.J.D. 002447449.) We have maintained such Status as a precautionary measure against the possibility of needing such a classification. We have not found that need, and as such, we are requesting that we be delisted.

Each of our Facility Annual Reports have indicated that we have had no T.S.D. activity, and we do not anticipate a change in the future.

If you need additional information from me, please let me know.

Thank You,

John C. Ehmann

John C. Ehmann
General Plant Manager

JCE:lr

cc: J. J. Culhane
J. C. Brzezinski
M. P. Engleman

ATTACHMENT 11

000039

PABST BREWING COMPANY

400 GROVE STREET • NEWARK, NJ 07106 (201) 373-6000 TWX #710-995-4467

July 18, 1985

Mr. Harold Carscadden
Industrial Operations
Passaic Valley Sewerage Commissioners
600 Wilson Avenue
Newark, NJ 07105

Dear Mr. Carscadden:

Enclosed is our quarterly report on the effluent discharged up to the date we ceased operations (June 7th, 1985).

Beyond that, we dumped a mixture of beer, water, and anhydrous ammonia during the period 6/13/85 through 6/25/85. The beer volume was 1,306,960 gallons. The ammonia is a more complicated subject. We dumped 8,000 lbs of ammonia gas. This is not a liquid measurement but a measure of gas weight. When blended with water this forms a weak alkaline solution.

Since we lost our chemists when the Plant closed, we were not able to perform COD or TSS analysis. The samples your people took will most likely be the source of analysis for this combination of beer and ammonia hydroxide.

Yours truly,

Michael P. Engleman
Plant Engineer

MPE:lr

Attachment

FNC000165

TO: FILE

FROM: RALPH LAMENDOLA

DATE: July 17, 1985

RE: Pabst Beer Dump - Possible Poor Effluent Quality Contributor

During the month of June, the Pabst Brewery Plant had a permanent shutdown which resulted in a scheduled effluent beer dump. The following information was obtained from Art Martinelli and Mario Graglia:

DATE	DAY OF WEEK	TIME OF DUMP	FLOWRATE GAL/DAY	ANHYDROUS AMMONIA LBS/DAY	BOD MG/L (1)
June 13	Thur.	Not Sure	Light	0	33,280
14	Fri.	" "	Medium	0	
17	Mon.	6a.m.-6p.m.	186,000	1142	105,900
18	Tue.	" "	"	"	
19	Wed.	" "	"	"	
20	Thur.	" "	"	"	
21	Fri.	" "	"	"	15,300
24	Mon.	" "	"	"	
25	Tue.	" "	"	"	
26	Wed.	6a.m.-10a.m.	"	Tot.=8,000lbs	Avg. = 51,493
			Tot. = 1.5 MG		

(1) GRAB SAMPLES OF PABST EFFLUENT

* No direct yeast had been dumped

	MIN.	MAX.	AVG.
BOD5 (mg/l)	15,300	105,900	51,493
BOD5 Loading (#day)	23,734	164,276	79,878
% of Plant Load (%)	5	33	16

	FIRST 15 DAYS OF MONTH	10 DAYS OF DUMP	% INCREASE
JD5 Inf. (mg/l)	297	401	35
BOD5 Eff. (mg/l)	37	87	135
BOD5 Loading (#day)	496,460	670,800	35

FNC000166

JUNE 1985

PLANT INFLUENT

COMPOSITE SAMPLE RESULTS (4 HR)
MONTHLY DATA SUMMARY

* AVERAGE OF pH READING 4 HR GRAB SAMPLES
† GRAB SAMPLES

	DATE	TOTAL BOD_5 mg/l	SOLUBLE BOD_5 mg/l	TOTAL TOC mg/l	SOLUBLE TOC mg/l	TOTAL COD mg/l	SOLUBLE COD mg/l	TSS mg/l	VSS mg/l	VSS %	TEMP °F †	pH UNITS *	D.O. mg/l †	SVI ml/gm †	ZSV FT/HR †	OUR mg/l-Hr †	RESPIRATION RATE mg/gm-Hr †	ORG-N mg/l	NH_3-N mg/l	NO_2-N mg/l	NO_3-N mg/l	TOTAL-P mg/l	ORTHO-P mg/l	ALKALINITY mg/l as $CaCO_3$	CHLORIDES mg/l	SETTLEABLE SOLIDS ml/l	OIL AND GREASE (mg/L)		TKN mg/l	% SOL. BOD_5
S	1	255				656		432				7.0														29				
S	2	252				[illegible]		[illegible]				6.8													[illegible]	37				
M	3	[illegible]	140	280	150	796	400	816	592	73	73	7.1						6	20		—	2.5		180	280	38			25	67
T	4	362	198			900	436	480			74	7.2									0.08				351	33	49			55
W	5	[illegible]	156	250	135	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	74	[illegible]													[illegible]	[illegible]				69
TH	6	[illegible]				904		[illegible]			74	7.0													293	33				
F	7	308				[illegible]		[illegible]			74	7.1														[illegible]				
S	8	[illegible]				[illegible]		[illegible]				[illegible]														[illegible]				
S	9	210				[illegible]		[illegible]				[illegible]													220	[illegible]				
M	10	[illegible]	202	—	—	[illegible]	[illegible]	[illegible]	308	68	73	[illegible]						4	[illegible]		—	—		—	—	37			[illegible]	[illegible]
T	11	311	[illegible]			[illegible]	[illegible]	548			74	7.1													[illegible]	30	76			[illegible]
W	12	[illegible]	[illegible]	[illegible]	160	[illegible]	[illegible]	432	—	—	74	7.0													[illegible]	31				[illegible]
TH	13	365				[illegible]		532			[illegible]	[illegible]													[illegible]	[illegible]				
F	14	365				1114		504			[illegible]	7.1														36				
S	15	[illegible]				[illegible]		424				7.1														31				
	AVG	297	206	273	148	844	399	480	344	64	74	7.1						5	14		0.08	2.5		180	295	35	63		24	69
S	16	215				[illegible]		424				[illegible]													191	30				
M	17	[illegible]	[illegible]	290	170	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	72	[illegible]						5	17		[illegible]	[illegible]		[illegible]	[illegible]	[illegible]			22	64
T	18	390	—			[illegible]	532	[illegible]			74	[illegible]													[illegible]	28	155			—
W	19	490	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	74	[illegible]													[illegible]	[illegible]				61
TH	20	460				[illegible]		[illegible]			[illegible]														[illegible]	[illegible]				
F	21	530				[illegible]		500			75	[illegible]														33				
S	22	[illegible]				776		700				[illegible]														34				
S	23	210				[illegible]		[illegible]				[illegible]													[illegible]	35				
M	24	333	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	58	[illegible]	[illegible]						[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	219	15			23	56
T	25	367	[illegible]			[illegible]	[illegible]	[illegible]			76	[illegible]													[illegible]	[illegible]	60			[illegible]
W	26	342	[illegible]	[illegible]	145	[illegible]	[illegible]	[illegible]	[illegible]	76	[illegible]	[illegible]													[illegible]	40				56
TH	27	342				905		[illegible]			75	7.1													[illegible]	40				
F	28	350				848		[illegible]			74	7.1														[illegible]				
S	29	330				764		[illegible]				7.0														36				
S	30	[illegible]				[illegible]		[illegible]				[illegible]													[illegible]	36				
	31																													
	AVG	354	225	275	158	826	464	483	322	66	75	7.0						6	17		0.21	6.4		179	241	31	108		23	59
	MIN	210	156	250	135	564	376	264	132	50	72	6.8						4	17		[illegible]	2.5		170	141	15	49		22	55
	MAX	530	300	290	175	1114	532	816	592	76	76	7.2						6	20		0.28	[illegible]		188	437	46	155		25	44
	MO AVG	326	215	274	154	835	432	481	331	65	74	7.0						5	18		0.16	5.1		179	277	33	85		23	64

FNC000167

JUNE '[illegible]

PLANT EFFLUE[illegible]

COMPOSITE SAMPLE RESULTS (4 HR)
MONTHLY DATA SUMMARY

* AVERAGE OF pH READING 4 HR GRAB SAMPLES
\+ GRAB SAMPLES

	DATE	TOTAL BOD5 mg/l	SOLUBLE BOD5 mg/l	TOTAL TOC mg/l	SOLUBLE TOC mg/l	TOTAL COD mg/l	SOLUBLE COD mg/l	TSS mg/l	VSS mg/l	VSS %	TEMP °F +	D.O. * UNITS	+ D.O. mg/l	SVI + ml/gm	ESV + FT/HR	OUR + mg/l-Hr	RESPIRATION RATE + mg/gm-hr	ORG-N mg/l	NH3-N mg/l	NO2-N mg/l	NO3-N mg/l	TOTAL-P mg/l	ORTHO-P mg/l	ALKALINITY mg/l as CaCO3	CHLORIDES mg/l	SETTLEABLE SOLIDS ml/l	% BOD5 REMOVAL	% SOL. BOD5 REMOVAL	% TSS REMOVAL	SOL. BOD5 %	TKN
S	1	31				184		22					6.4													0					
S	2	11	7			216		19	—	—			[illegible]												[illegible]	0				64	
M	3	23	6	50	70	180	165	39	27	69	75		6.8					4	17		—	1.5		180	257	0				26	21
T	4	61	43			252	216	35	27	77	76		6.7								0.29				331	0				71	
W	5	51	37	85	12	[illegible]	176	47	35	75	77														[illegible]	0				73	
TH	6	40	25			196		29	21	73	74		6.5												296	0				72	
F	7	30				227		34			75		6.4													0					
S	8	[illegible]				[illegible]		30					[illegible]													[illegible]					
S	9	15	8			200		49	25	51			6.6												240	0				55	
M	10	31	25	—	—	204	190	[illegible]	[illegible]	[illegible]	76		[illegible]					3	17		—	—		—	—	0.67				81	[illegible]
T	11	70	—			263	227	53	45	85	76		6.6												314	0.5				—	
W	12	31	21	100	[illegible]	[illegible]	[illegible]	28	—	—	71		6.5												316	0				6[illegible]	
TH	13	46	40			239		36	12	40	75		[illegible]												34[illegible]	0.7				[illegible]	
F	14	46				250		30			76		6.6													0					
S	15	[illegible]				[illegible]		27					6.6													0					
	AVG	37	24	88	80	230	199	34	29	64	76		6.6					4	17		0.29	1.5		180	292	0.09	88	86	93	56	2
S	16	[illegible]	16			180		23	15	55			6.6												160	0				67	
M	17	72	52	100	90	232	176	41	34	83	[illegible]		6.5					6	14		0.30	2.6		[illegible]	212	0.17				72	[illegible]
T	18	100	64			[illegible]	[illegible]	34	—	—	[illegible]		6.5												264	0				64	
W	19	127	95	170	150	[illegible]		35	[illegible]	83	75		6.6												2[illegible]					75	
TH	20	98	72					[illegible]	31	26	[illegible]		[illegible]												[illegible]	0				73	
F	21	100				398		35			77		[illegible]													0					
S	22	96				293		32					6.[illegible]													0					
S	23	81	61			210		24	23	96			6.5												[illegible]	0				75	
M	24	79	56	85	80	202	166	73	[illegible]	84	[illegible]		[illegible]					0.5	12		[illegible]	4.1		15[illegible]	[illegible]	1.3				71	11
T	25	108	81			[illegible]	[illegible]	35	33	94	[illegible]		6.5												[illegible]	0				75	
W	26	92	72	110	100	[illegible]	250	[illegible]	[illegible]	73	77		[illegible]												[illegible]	0				79	
TH	27	86	60			311		[illegible]	26	91	77		6.7												386	0				70	
F	28	87				[illegible]		24			76		6.7													0					
S	29	95				284		14					6.6													0					
S	30	40	34			206		34	—	—			[illegible]												239	0				85	
	31																														
	AVG	86	60	116	108	294	258	34	30	82	77		6.6					3	13		0.33	3.4		166	257	0.10	76	68	93	73	16
	MIN	11	6	80	70	180	166	14	12	40	74		6.4					0.5	12		0.29	1.5		156	160	0	61	62	82	26	11
	MAX	108	95	170	160	475	408	58	48	96	78		6.8					6	17		0.35	4.1		180	386	1.3	96	97	96	97	21
	MO AVG	62	44	104	96	262	229	34	29	76	76		6.6					3	15		0.31	2.7		171	273	0.09	81	77	93	66	18

FNC000168

ATTACHMENT 12

PASSAIC VALLEY SEWERAGE COMMISSIONERS

Date: 7-10-78 Interviewed by: SCOTT & VANMALDEN

PVSC Industry # N-1460

Industrial Wastewater

Questionnaire

Part A

"attach business card"

1) Industry Name PABST BREWING CO.

2) Address 400 (No.) GROVE STREET (Street) NEWARK (Municipality)

3) Responsible Person to whom further inquiries should be directed:

Name	Title	Telephone
H.A. BLAIR	PLANT ENGINEER	373-6000

4) Type of Industry MFG. MALT BEVERAGES

5) Primary S.I.C. number, if available 2082
(4 Digit Code from 1976 standard industrial classification manual)

6) Principle Raw Materials(s) used BARLEYMALT, CORN GRITS, HOPS. WATER

7) Principle Product(s) produced MALT BEVERAGES

8) Hours per day manufacturing operations are conducted 24

Days per week manufacturing operations are conducted 7

Process Discharge Frequency (circle one) Continuous Intermittant # of Batches/Day ____ Times of Day ____

9) Number of employees at this location 750

10) Indicate plant water consumption figures in gallons or cubic feet during the most recent calender quarter. If you obtain water from a privately owned well and do not meter your consumption from this source, indicate the capacity of the well pump(s) in gallons per minute and the approximate daily running time(s) in hours per day.

FNC000003

Industrial Wastewater

Questionnaire

Part A

Continued

City or Public Supply		Private Well Supply	
108,171,520	Gallons/Quarter	21,541,540	Gallons/Quarter
14 459,500	Cubic Feet/Quarter	2,879,500	Cubic Feet/Quarter
NEWARK	Name of City or Public Supply		Well Pump(s) Gal/Min.
			Pump Running time(s) Hrs/Day

21.3% of Water Used in Actual Process

78.7% of Water Discharged From Process

13.8% of Water Discharged as Non-Contact Cooling Water

.5% of Water Discharged From Sanitary Conveniences

Indicate Location of Water Meter:

CHECK WITH BLAIR.

Industrial Wastewater

Questionnaire

Part B

1) Number of metal contributing discharge points to municipal sewer: 1

2) Check off which of the below is in each metal discharge point:

Line A		Line B		Line C	
Any detectable gas		Any detectable gas		Any detectable gas	
Process	X	Process		Process	
N.C. Cooling	X	N.C. Cooling		N.C. Cooling	
Sanitary	X	Sanitary		Sanitary	
Storm	-	Storm		Storm	

3) Illustrate the processing areas, the eminating discharge sanitary line(s) carrying the metals contaminated wastewater, the location of the proposed sampling manhole, any upstream manhole, and the receiving municipal sewer. Label each metal process sanitary line A.B,C,.... Indicate landmarks. If sampling or flow measuring device already exists, indicate so. Attach any existing schematics of sanitary layout provided by the company.

SEE SCHEMATIC

4) Describe each manhole or sampling location in detail. (Label A.B,C,...)

LETTER A

MANHOLE:

(circular) surface Ø 22"

inside length 4' Ø (parallel with pipe)

inside width ____

entire depth 6'

junction manhole yes ____ no X # of in pipes 1

PIPES:

in pipe Ø 24" % full 50

out pipe Ø 24" % full 50

water depth in pipe 12"

surcharged yes ____ no X

CHANNEL:

water depth 12" benched yes ____ no X

water depth range CONSTANT.

water velocity ____ turburlence yes ____ no X

super critical velocity yes ____ no X

roll in front of stake X roll behind stake ____

channel configuration straight X curved ____ sloped ____

instantaneous flow ____ drop ____

SAMPLING:

can be harnessed in MH X placed in MH ____

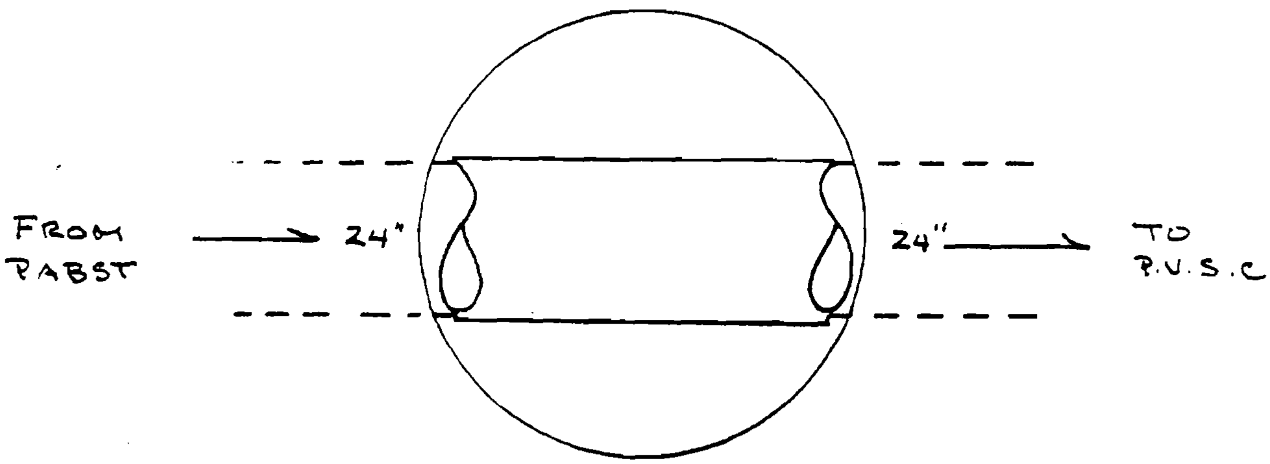
or placed outside MH ____

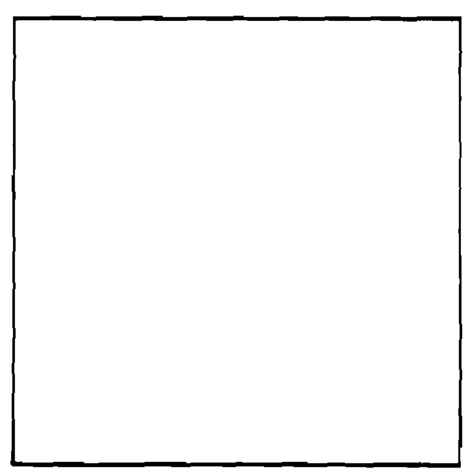
(vandalism problem yes ___ no ___)

FNC000007

5) Sketch each manhole or sampling location in detail. Attach photograph (Label A,B,C,.....).

LETTER A.





FNC000008

TO BE COMPLETED IN OFFICE

6) Final recommendations for flow measurement & sampling.

	Sampling Line		
	A	B	C
SAMPLING:			
Automatic	X		
Manual			
FLOW MEASUREMENT:			
Automatic			
Depth of flow in in-pipe,veloc/cur. meter, dipper method	X		
Depth of flow in in-pipe, veloc/dye, dipper method (shallow flows)			
Depth of flow in in-pipe, slope to upstream MH, rough, dipper method			
90° v-notch weir in out-pipe, dipper method			
Insert flume in out-pipe, dipper method			
Inflatable flume in in-pipe, dipper method (up to 8"Ø)			
Weir-box w/inflatable tube, dipper method			
Up & downstream depths of flow in mun. coll/syst., slope, rough, dipper method			
Manual			
Bucket & stop-watch (elevated sewers w/smaller flows)			
Trajectory method (elevated sewers) carpenters square			
Depth of flow in in-pipe, weir method			
Water meter readings			

FNC000009

TO BE COMPLETED IN OFFICE

7) Recommendations for sampling and flow measurement, including equipment and special devices required (A,B,C,...). Check if required and size.

AUTOMATIC	A	B	C
Samplers	X		
Harness	X		
Current Meter (velocity)	X		
Dye & Watch			
Dippers	X		
Rod & Transit			
Flumes			
Insert			
Inflatable			
4"			
6"			
8"			
10"			
12"			
15"			
Weirs v-notch (90°)			
4"			
6"			
8"			
10"			
12"			
15"			
Weir Box (inflatable)			
Packing			
Blocks			
Sand Bags			
Caulking			
MANUAL			
Bottles			
Bucket & watch			
Weirs (v-notch 90°)			
4"			
6"			
8"			
10"			
12"			
15"			
Carpenter's square with level			

NOTES:

TO BE COMPLETED IN OFFICE

8) Miscellaneous notes and recommendations (i.e., manhole construction recommended, must be monitored during dry weather, equipment suggestions, etc.)

PABST HAS DIRECT CONNECTION WITH PVSC AT GROVE STREET. SAMPLING SITE A IS LOCATED PRIOR TO CONNECTION ON GROVE STREET BETWEEN FERDINAND STREET AND 13th AVENUE. M.H. COVER IS MARKED WITH ORANGE PAINT.

NOTE: PABST HAS BEEN CONDUCTING SMPLING AND FLOW MEAS. AT SAME LOCATION. PICTURE NOT POSSIBLE AS PABST'S SAMPLER WAS INSTALLED IN M.H.

Industrial Wastewater

Questionnaire

Part C

1) Do you pretreat any wastewater before discharging to the sanitary sewer?
NO

If the answer is "yes", briefly describe pretreatment method(s), what specific parameter pretreatment is utilized for, and how is residue generated by pretreatment disposed.

2) The following tests will be performed by PVSC at a later date on a series of 24 hour flow proportioned composite samples collected over a period of two (2) consecutive production days. Samples shall be collected from each individual waste sewer leaving your plant which is connected directly to the municipal PVSC sanitary sewer system.

Previous Measurements of Flow and Metals (if available)

Analysis	A	B	C
Daily Flow (Gal/Day)			
Chromium (mg/l)			
Cadmium (mg/l)			
Copper (mg/l)			
Lead (mg/l)			
Nickel (mg/l)			
Zinc (mg/l)			
Mercury (mg/l)			
Arsenic (mg/l)			
Vanadium (mg/l)			
Selenium (mg/l)			
Beryllium (mg/l)			

FNC000012

ATTACHMENT 13

Return to:
PASSAIC VALLEY SEWERAGE COMMISSIONERS
?0 Broad Street
Newark, N. J. 07102

Date: June 6, 1972

Plant Ref. No. ICE0252

WASTE EFFLUENT SURVEY

(For Industries Served by the Passaic Valley Sewerage Commissioners)

Plant Name: Pabst Brewing Company

Address: 400 Grove Street, Newark, New Jersey Zip 07106

Person and Title to whom any further inquiries should be directed:

John F. Davis, Plant Engineer

Phone No.: 201-373-6000

Number of Employees: 725

Number of Working Days Per Week: 6-7

Number of Shifts Per Day: 3

Area of Property: 10 Acres, or Sq. Ft.

Type of Industry and 4 digit U. S. Standard Industrial Classification No.: 2082

Malt liquor and brewing by-product

Finished Product(s): Beer

Average Production: 205,906 barrels per month (2,470,872 barrels per year)

Raw Materials Used: Barley malt, corn grits, hops, yeast and water

Brief Description of Operations: Brewing and packaging of beer

FNC000023

Water received in *Gallons* (Note: multiply cu. ft. x 7.48)

Purchased water in 1971 from: City of Newark

1st Quarter	107,850,380	
2nd Quarter	122,666,764	
3rd Quarter	149,562,600	
4th Quarter	141,662,972	
Total Purchased 1971:		521,742,716

Well Water

1st Quarter	95,590,440	
2nd Quarter	87,397,200	
3rd Quarter	51,628,480	
4th Quarter	49,199,400	
Total well water received in 1971:		283,815,520

River Water

1st Quarter	-	
2nd Quarter	-	
3rd Quarter	-	
4th Quarter	-	
Total river water taken in in 1971:	-	

TOTAL OF ALL WATER RECEIVED IN 1971: 805,558,236

Water Use in 1971:

Water to Product (include evaporated and lost water):	114,200,000
Water to Sanitary Sewer:	594,568,000
Water to Storm Sewer, River or Ditch:	96,790,000
TOTAL WATER USE IN 1971:	805,558,236

Name of River, Stream, or Tributary, and location of storm sewer or ditch outlet to river, stream, or tributary: South Orange Avenue Storm Sewer

ANSWER THE FOLLOWING QUESTIONS ONLY IF THE
PLANT WASTE INCLUDES WASTE ATTRIBUTABLE TO INDUSTRIAL OPERATIONS
(Note: Analyses should be based on a 24-hour composite sample)

Characteristics of Plant Waste discharged to sanitary or combined sewer, after treatment if any. Indicate units of measure where applicable (e.g. Mg/l).

a) pH: 5.0; 4.6; 5.2 b) Turbidity: 190; 330; 370

c) Temperature: 24°C; 21°C; 23° C d) Radioactive? Yes .... No Not tested

e) Solids Concentration:

1) Total Solids 1517; 2817; 2789 Volatile 1229; 1658; 1491 Mineral 288; 1159; 1298

2) Suspended Solids 830; 2370; 630 Volatile 445; 1650; 470 Mineral 385; 720; 160

f) Oil and Grease Concentration:

1) Floatable Oils Not detected

2) Emulsified Oils 33.2; 230; 340

g) Chlorides 354; 354; 425

h) Chemical Oxygen Demand (C.O.D.): 1940; 2260; 1310

i) 5-day Bio-chemical Oxygen Demand (B.O.D.): 3400; 4700; 3700

j) Total organic carbon (T.O.C.): 563; 814; 491

k) Metallic Ions—Name and concentration (Important—list each metal in waste, e.g., chromium hex. and triv. Antimony, Lead, Mercury, Copper, Vanadium, Nickel; give concentration and total daily discharge of each metal.)

See United States Testing Company report, pages 6 and 7 dated May 10, 1972 and for mercury and residual chlorine United States Testing Company report dated June 2, 1972.

l) Toxic Material—Name and concentration e.g., cyanide salts, etc.): None used - no test performed

m) Solvents—Name and concentration: Not detected - See United States Testing Company report dated June 2, 1972

n) Resins—Name and concentration (Lacquers, Varnishes, Synthetics): Not detected - See United States Testing Company report dated June 2, 1972

FNC000025

o) Date and time span of sample 4/10/72; 4/11/72; 4/12/72 - twenty-four hours each

Explain hours, method of discharge of waste to Sanitary Sewer and peak rate of flow, e.g., (continuing for 8 hours per day, 5 days per week at 100 gal./day rate) (batch twice a day for 20 minutes at 100 gal./min.) (Continuous 24 hours steady or with peaks at 2 P.M., peak rate 3 M.G.D.) etc.

24 hours/day 6-7 days/week (steady) 779 gpm; 790 gpm; 819 gpm - from United States Testing Company report page 2 dated May 10, 1972. From page 2 of questionnaire Total Water to Sanitary Sewer of 594,568,000 gallons the rates are as follows: 1380 gpm/6 day operation; 1150 gpm/7 day operation.

Characteristics of Plant Discharge to Storm Sewer, River, or Ditch, after treatment if any. Indicate units of measure where applicable (e.g., Mg/l).

a) pH: 8.2; 8.0; 8.6 b) Turbidity: <18; <18; <18

c) Temperature: 24°C; 24°C; 23°C d) Radioactive? Yes .... No Not tested

e) Solids Concentration:

1) Total Solids 86; 92; 109 Volatile 29; 22; 32 Mineral 57; 70; 77

2) Suspended Solids 52; 19; 27 Volatile 40; 14; 26 Mineral 12; 5; 1

f) Oil and Grease Concentration:

1) Floatable Oils Not detected

2) Emulsified Oils 3.6; 2.4; 0.4

g) Chlorides 9; 9; 6

h) Chemical Oxygen Demand (C.O.D.): 9.8; 19.5; 19.5

i) 5-day Bio-chemical Oxygen Demand (B.O.D.): 6.6; 5.6; 8.6

j) Total Organic Carbon (T.O.C.): 15.3; 14.2; 10.4

k) Metallic Ions—Name and concentration (Important—list each metal in waste, e.g., chromium hex. and triv. Antimony, Lead, Mercury, Copper, Vanadium, Nickel; give concentration and total daily discharge of each metal.):

See United States Testing Company report pages 6 and 7 dated May 10, 1972 and for Mercury and Residual Chlorine United States Testing Company report dated June 2, 1972.

l) Toxic Material—Name and concentration (e.g., cyanide salts, etc.): None used - not tested

m) Solvents—Name and concentration: Not detected - see United States Testing Company report dated June 2, 1972

n) Resins—Name and concentration (Lacquers, Varnishes, Synthetics): Not detected. see United States Testing Company report dated June 2, 1972

o) Date and time span of sample: 4/14/72; 4/17/72; 4/18/72 - twenty-four hours each

Do you pretreat any waste before discharge? No

If so, describe process and disposal of residue removed: ....

Certification of Laboratory doing sampling and making analyses shall be given. Procedures shall be those shown in the 13th edition of Standard Methods for the Examination of Water and Wastewater, where applicable. If no procedure is applicable, the laboratory is to describe method and procedure used in analyses.

J. T. Davis, Plant Engineer

Signature and title of person preparing report

ATTACHMENT 14

Return to:
PASSAIC VALLEY SEWERAGE COMMISSIONERS
600 Wilson Avenue
Newark, N. J. 07105
(201) 344-1800

Date: April 14, 1975

Plant Ref. No. ....

WASTE EFFLUENT SURVEY

(For Industries Served by the Passaic Valley Sewerage Commissioners)

Plant Name: Pabst Brewing Company

Address: 400 Grove St., Newark, N. J. Zip 07106

Person and Title to whom any further inquiries should be directed:

H. A. Blair, Plant Engineer

Phone No.: (201) 373-6000

Number of Employees: 900

Number of Working Days Per Week: 6 - 7

Number of Shifts Per Day: 3

Area of Property: 10 Acres, or .... Sq. Ft.

Type of Industry and 4 digit U. S. Standard Industrial Classification No.: 2082

Malt Beverages

Finished Product(s): Beer

Average Production: 206,000 barrels per month (2,472,000 barrels per year)

Raw Materials Used: Barley malt, corn grits, hops, and water

Brief Description of Operations: Brewing and packaging of beer

Water received in *Gallons* (Note: multiply cu. ft. x 7.48)

Purchased water in 1974 from: City of Newark

1st Quarter 116,562,566

2nd Quarter 124,994,472

3rd Quarter 118,181,388

4th Quarter 110,687,511

Total Purchased 1974: 470,425,937

Well Water

1st Quarter 61,405,200

2nd Quarter 37,289,520

3rd Quarter 21,849,120

4th Quarter 20,516,760

Total well water received in 1974: 141,060,600

River Water

1st Quarter .... -

2nd Quarter .... -

3rd Quarter .... -

4th Quarter .... -

Total river water taken in 19___: .... -

TOTAL OF ALL WATER RECEIVED IN 1974: 611,486,537

Water Use in 1974:

Water to Product (include evaporated and lost water): 121,494,402

Water to Sanitary Sewer: 440,507,570

Water to Storm Sewer, River or Ditch: 49,484,560

TOTAL WATER USE IN 1974: 611,486,532

Name of River, Stream, or Tributary, and location of storm sewer or ditch outlet to river, stream, or tributary: South Orange Avenue Storm Sewer, Maybaum Creek, Rahway River

ANSWER THE FOLLOWING QUESTIONS ONLY IF THE PLANT WASTE INCLUDES WASTE ATTRIBUTABLE TO INDUSTRIAL OPERATIONS

(Note: Analyses should be based on a 24-hour composite sample)

Characteristics of Plant Waste discharged to sanitary or combined sewer, after treatment if any. Indicate units of measure where applicable (e.g. Mg/l).

a) pH: 4.6 b) Turbidity: 32 (J.T.U.)

c) Temperature: 22^{o} C. d) Radioactive? Yes ______ No X

e) Solids Concentration:

1) Total Solids 2100 mg/l Volatile 1900 mg/l Mineral 200 mg/l

2) Suspended Solids 970 mg/l Volatile 910 mg/l Mineral 60 mg/l

f) Oil and Grease Concentration:

1) Floatable Oils None

2) Emulsified Oils 21.6 mg/l

g) Chlorides 72 mg/l

h) Chemical Oxygen Demand (C.O.D.): 5200 mg/l

i) 5-day Bio-chemical Oxygen Demand (B.O.D.): 3400 mg/l

j) Total organic carbon (T.O.C.): 2000 mg/l

k) Metallic Ions—Name and concentration (Important—list each metal in waste, e.g., chromium hex. and triv. Antimony, Lead, Mercury, Copper, Vanadium, Nickel; give concentration and total daily discharge of each metal.)

Chromium less than 0.05 mg/l, Chromium Hexavalent less than 0.004 mg/l.

l) Toxic Material—Name and concentration e.g., cyanide salts, etc.): None used

m) Solvents—Name and concentration: Not detected

n) Resins—Name and concentration (Lacquers, Varnishes, Synthetics): Not detected

o) Date and time span of sample 2/25/75; 2/26/75 twenty-four hours

Explain hours, method of discharge of waste to Sanitary Sewer and peak rate of flow, e.g., (continuing for 8 hours per day, 5 days per week at 100 gal./day rate) (batch twice a day for 20 minutes at 100 gal./min.) (Continuous 24 hours steady or with peaks at 2 P.M., peak rate 3 M.G.D.) etc.

Continuous 24 hr. 6 - 7 days/week

FNC000038

Characteristics of Plant Discharge to Storm Sewer, River, or Ditch, after treatment if any. Indicate units of measure where applicable (e.g., Mg/l).

a) pH: 7.0 b) Turbidity: less than 25 (J.T.U.)

c) Temperature: $22^{o}C$. d) Radioactive? Yes ...... No X

e) Solids Concentration:

1) Total Solids 131 mg/l. Volatile 113 mg/l. Mineral 18 mg/l.

2) Suspended Solids 47 mg/l. Volatile 35 mg/l. Mineral 12 mg/l.

f) Oil and Grease Concentration:

1) Floatable Oils None

2) Emulsified Oils 3.9 mgl.

g) Chlorides 21 mg/l.

h) Chemical Oxygen Demand (C.O.D.): 68 mg/l.

i) 5-day Bio-chemical Oxygen Demand (B.O.D.): 5.2 mg/l.

j) Total Organic Carbon (T.O.C.): 6 mg/l.

k) Metallic Ions—Name and concentration (Important—list each metal in waste, e.g., chromium hex. and triv. Antimony, Lead, Mercury, Copper, Vanadium, Nickel; give concentration and total daily discharge of each metal.):

Chromium total less than 0.05 mg/l., Chromium Hexavalent less than 0.004 mg/l.

l) Toxic Material—Name and concentration (e.g., cyanide salts, etc.): None used

m) Solvents—Name and concentration: Not detected

n) Resins—Name and concentration (Lacquers, Varnishes, Synthetics): Not detected

o) Date and time span of sample: 3/27/75 - twenty-four hour

Do you pretreat any waste before discharge? No

If so, describe process and disposal of residue removed: -

Sampling and tests performed by U. S. Testing Company, Inc. in accordance with Standard Methods for the Examination of Water and Wastewater of American Public Health Association 13th edition, 1971.

Certification of Laboratory doing sampling and making analyses shall be given. Procedures shall be those shown in the 13th edition of Standard Methods for the Examination of Water and Wastewater, where applicable. If no procedure is applicable, the laboratory is to describe method and procedure used in analyses.

H. A. Blair

FNC000039

Signature and title of person preparing report

H. A. Blair - Plant Engineer

Return to:
PASSAIC VALLEY SEWERAGE COMMISSIONERS
790 Broad Street
Newark, N. J. 07102

Date: June 6, 1972

Plant Ref. No. 1CE0252

WASTE EFFLUENT SURVEY

(For Industries Served by the Passaic Valley Sewerage Commissioners)

Plant Name: Pabst Brewing Company

Address: 400 Grove Street, Newark, New Jersey Zip 07101

Person and Title to whom any further inquiries should be directed:

John F. Davis, Plant Engineer

Phone No.: 201-373-6000

Number of Employees: 725

Number of Working Days Per Week: 6-7

Number of Shifts Per Day: 3

Area of Property: 10 Acres, or .... Sq. Ft.

Type of Industry and 4 digit U. S. Standard Industrial Classification No.: 2082

Malt liquor and brewing by-product

Finished Product(s): Beer

Average Production: 205,906 barrels per month (2,470,872 barrels per year)

Raw Materials Used: Barley malt, corn grits, hops, yeast and water

Brief Description of Operations: Brewing and packaging of beer

FNC000040

Water received in *Gallons* (Note: multiply cu. ft. x 7.48)

Purchased water in 1971 from: City of Newark

1st Quarter 107,850,380

2nd Quarter 122,666,764

3rd Quarter 149,562,600

4th Quarter 141,662,972

Total Purchased 1971: 521,742,716

Well Water

1st Quarter 95,590,440

2nd Quarter 87,397,200

3rd Quarter 51,628,480

4th Quarter 49,199,400

Total well water received in 1971: 283,815,520

River Water

1st Quarter -

2nd Quarter -

3rd Quarter -

4th Quarter -

Total river water taken in in 1971: -

TOTAL OF ALL WATER RECEIVED IN 1971: 805,558,236

Water Use in 1971:

Water to Product (include evaporated and lost water): 114,200,000

Water to Sanitary Sewer: 594,568,000

Water to Storm Sewer, River or Ditch: 96,790,000

TOTAL WATER USE IN 1971: 805,558,236

Name of River, Stream, or Tributary, and location of storm sewer or ditch outlet to river, stream, or tributary: South Orange Avenue Storm Sewer

ANSWER THE FOLLOWING QUESTIONS ONLY IF THE PLANT WASTE INCLUDES WASTE ATTRIBUTABLE TO INDUSTRIAL OPERATIONS

(Note: Analyses should be based on a 24-hour composite sample)

Characteristics of Plant Waste discharged to sanitary or combined sewer, after treatment if any. Indicate units of measure where applicable (e.g. Mg/l).

a) pH: 5.0; 4.6; 5.2 b) Turbidity: 190; 330; 370

c) Temperature: 24°C; 21°C; 23° C d) Radioactive? Yes .... No Not tested

e) Solids Concentration:

1) Total Solids 1517; 2817; 2789 Volatile 1229; 1658; 1491 Mineral 288; 1159; 1298

2) Suspended Solids 830; 2370; 630 Volatile 445; 1650; 470 Mineral 385; 720; 160

f) Oil and Grease Concentration:

1) Floatable Oils Not detected

2) Emulsified Oils 33.2; 230; 340

g) Chlorides 354; 354; 425

h) Chemical Oxygen Demand (C.O.D.): 1940; 2260; 1310

i) 5-day Bio-chemical Oxygen Demand (B.O.D.): 3400; 4700; 3700

j) Total organic carbon (T.O.C.): 563; 814; 491

k) Metallic Ions—Name and concentration (Important—list each metal in waste, e.g., chromium hex. and triv. Antimony, Lead, Mercury, Copper, Vanadium, Nickel; give concentration and total daily discharge of each metal.)

See United States Testing Company report, pages 6 and 7 dated May 10, 1972 and for mercury and residual chlorine United States Testing Company report dated June 2, 1972.

l) Toxic Material—Name and concentration e.g., cyanide salts, etc.): None used - no test performed

m) Solvents—Name and concentration: Not detected - See United States Testing Company report dated June 2, 1972

n) Resins—Name and concentration (Lacquers, Varnishes, Synthetics): Not detected - See United States Testing Company report dated June 2, 1972

FNC000042

o) Date and time span of sample 4/10/72; 4/11/72; 4/12/72 - twenty-four hours each

Explain hours, method of discharge of waste to Sanitary Sewer and peak rate of flow, e.g., (continuing for 8 hours per day, 5 days per week at 100 gal./day rate) (batch twice a day for 20 minutes at 100 gal./min.) (Continuous 24 hours steady or with peaks at 2 P.M., peak rate 3 M.G.D.) etc.

24 hours/day 6-7 days/week (steady) 779 gpm; 790 gpm; 819 gpm - from United States Testing Company report page 2 dated May 10, 1972. From page 2 of questionnaire Total Water to Sanitary Sewer of 594,568,000 gallons the rates are as follows: 1380 gpm/6 day operation; 1150 gpm/7 day operation.

Characteristics of Plant Discharge to Storm Sewer, River, or Ditch, after treatment if any. Indicate units of measure where applicable (e.g., Mg/l).

a) pH: 8.2; 8.0; 8.6 b) Turbidity: <18; <18; <18

c) Temperature: 24°C; 24°C; 23°C d) Radioactive? Yes .... No Not tested

e) Solids Concentration:

1) Total Solids 86; 92; 109 Volatile 29; 22; 32 Mineral 57; 70; 77

2) Suspended Solids 52; 19; 27 Volatile 40; 14; 26 Mineral 12; 5; 1

f) Oil and Grease Concentration:

1) Floatable Oils Not detected

2) Emulsified Oils 3.6; 2.4; 0.4

g) Chlorides 9; 9; 6

h) Chemical Oxygen Demand (C.O.D.): 9.8; 19.5; 19.5

i) 5-day Bio-chemical Oxygen Demand (B.O.D.): 6.6; 5.6; 8.6

j) Total Organic Carbon (T.O.C.): 15.3; 14.2; 10.4

k) Metallic Ions—Name and concentration (Important—list each metal in waste, e.g., chromium hex. and triv. Antimony, Lead, Mercury, Copper, Vanadium, Nickel; give concentration and total daily discharge of each metal.):

See United States Testing Company report pages 6 and 7 dated May 10, 1972 and for Mercury and Residual Chlorine United States Testing Company report dated June 2, 1972.

l) Toxic Material—Name and concentration (e.g., cyanide salts, etc.): None used - not tested

m) Solvents—Name and concentration: Not detected - see United States Testing Company report dated June 2, 1972

n) Resins—Name and concentration (Lacquers, Varnishes, Synthetics): Not detected. see United States Testing Company report dated June 2, 1972

o) Date and time span of sample: 4/14/72; 4/17/72; 4/18/72 - twenty-four hours each

Do you pretreat any waste before discharge? No

If so, describe process and disposal of residue removed:

FNC000043

Certification of Laboratory doing sampling and making analyses shall be given. Procedures shall be those shown in the 13th edition of Standard Methods for the Examination of Water and Wastewater, where applicable. If no procedure is applicable, the laboratory is to describe method and procedure used in analyses.

J. T. Divers, Plant Engineer

Signature and title of person preparing report

UNITED STATES TESTING COMPANY, INC.

REPORT OF WATER AND WASTEWATER ANALYSIS

Client: Pabst Brewing Company **Report No.:** 67182 **Date:** 6/2/72

Sample No.: 1 **Description** Grove Street - 4/10/72

Sample No.: 2 **Description** Grove Street - 4/11/72

TEST	SAMPLE NO. 1	SAMPLE NO. 2
Acidity (as $CaCO_3$)		
Alkalinity, Total (as $CaCO_3$)		
Alkalinity		
Hydroxide		
Carbonate		
Bicarbonate		
Bromides		
Total Organic Carbon		
Chemical Oxygen Demand (COD)		
Chlorides		
Chlorine Residual	<0.02	<0.02
Chlorinated Hydrocarbons		
Cyanides		
Fluorides		
[illegible]dness, Total		
Iodide		
Nitrogen		
Ammonia		
Nitrate		
Nitrite		
Kjeldahl		
Oil/Grease		
pH (Units)		
Phenols		
Phosphate, Total		
Silica, Dissolved		
Solids		
Total		
Suspended		
Volatile		
Total Dissolved		
Volatile Suspended		
Settleable Solids		
Sulfates		
Sulfides		
Sulfites		
Solvents	ND	
R[illegible]ins	ND	

TEST	SAMPLE 1	
Surfactants		
Aluminum		
Antimony		
Arsenic		
Beryllium		
Cadmium		
Calcium		
Chromium, Total		
Chromium, Hexavalent		
Cobalt		
Copper		
Iron		
Lead		
Magnesium		
Manganese		
Mercury	.0063	.0
Molybdenum		
Nickel		
Potassium		
Selenium		
Sodium		
Tin		
Titanium		
Zinc		
Immediate Oxygen Demand		
Biochemical Oxygen Demand (5 days)		
Biochemical Oxygen Demand (20 days)		
Coliform, Total (MPN/100 mls.)		
Coliform, Fecal (MPN/100 mls.)		
Fecal Streptococcus (MPN/100 mls.)		
Total Plate Count (per ml.)		
Odor (Units)		
Color (Units)		
Specific Conductance (micromhos/cm.)		
Taste (Units)		
Turbidity (J.T.U.)		

REMARKS: ND = Not Detected

UNITED STATES TESTING COMPANY, INC.

REPORT OF WATER AND WASTEWATER ANALYSIS

Client: Pabst Brewing Company **Report No.:** 67182 **Date:** 6/2/72

Sample No.: 3 **Description** Grove Street - 4/12/72

Sample No.: 4 **Description** #2 Manhole - 4/14/72

TEST	SAMPLE NO. 3	SAMPLE NO. 4
Acidity (as $CaCO_3$)		
Alkalinity, Total (as $CaCO_3$)		
Alkalinity		
Hydroxide		
Carbonate		
Bicarbonate		
Bromides		
Total Organic Carbon		
Chemical Oxygen Demand (COD)		
Chlorides		
Chlorine Residual	<0.02	<0.02
Chlorinated Hydrocarbons		
Cyanides		
Fluorides		
rdness, Total		
dide		
Nitrogen		
Ammonia		
Nitrate		
Nitrite		
Kjeldahl		
Oil/Grease		
pH (Units)		
Phenols		
Phosphate, Total		
Silica, Dissolved		
Solids		
Total		
Suspended		
Volatile		
Total Dissolved		
Volatile Suspended		
Settleable Solids		
Sulfates		
Sulfides		
Sulfites		
Solvents	ND	
Resins	ND	

TEST	SAMPLE 3	
Surfactants		
Aluminum		
Antimony		
Arsenic		
Beryllium		
Cadmium		
Calcium		
Chromium, Total		
Chromium, Hexavalent		
Cobalt		
Copper		
Iron		
Lead		
Magnesium		
Manganese		
Mercury	.0056	.0
Molybdenum		
Nickel		
Potassium		
Selenium		
Sodium		
Tin		
Titanium		
Zinc		
Immediate Oxygen Demand		
Biochemical Oxygen Demand (5 days)		
Biochemical Oxygen Demand (20 days)		
Coliform, Total (MPN/100 mls.)		
Coliform, Fecal (MPN/100 mls.)		
Fecal Streptococcus (MPN/100 mls.)		
Total Plate Count (per ml.)		
Odor (Units)		
Color (Units)		
Specific Conductance (micromhos/cm.)		
Taste (Units)		
Turbidity (J.T.U.)		

REMARKS:

UNITED STATES TESTING COMPANY, INC.

REPORT OF WATER AND WASTEWATER ANALYSIS

Client: Pabst Brewing Company **Report No.:** 67182 **Date:** 6/2/72

Sample No.: 5 **Description** Manhole #2 - 4/17/72

Sample No.: 6 **Description** Manhole #2 - 4/18/72

TEST	SAMPLE NO. 5	SAMPLE NO. 6
Acidity (as $CaCO_3$)		
Alkalinity, Total (as $CaCO_3$)		
Alkalinity		
Hydroxide		
Carbonate		
Bicarbonate		
Bromides		
Total Organic Carbon		
Chemical Oxygen Demand (COD)		
Chlorides		
Chlorine Residual	<0.02	<0.02
Chlorinated Hydrocarbons		
Cyanides		
Fluorides		
Hardness, Total		
Iodide		
Nitrogen		
Ammonia		
Nitrate		
Nitrite		
Kjeldahl		
Oil/Grease		
pH (Units)		
Phenols		
Phosphate, Total		
Silica, Dissolved		
Solids		
Total		
Suspended		
Volatile		
Total Dissolved		
Volatile Suspended		
Settleable Solids		
Sulfates		
Sulfides		
Sulfites		
Solvents	ND	
Resins	ND	

TEST	SAMPLE 5
Surfactants	
Aluminum	
Antimony	
Arsenic	
Beryllium	
Cadmium	
Calcium	
Chromium, Total	
Chromium, Hexavalent	
Cobalt	
Copper	
Iron	
Lead	
Magnesium	
Manganese	
Mercury	.0052
Molybdenum	
Nickel	
Potassium	
Selenium	
Sodium	
Tin	
Titanium	
Zinc	
Immediate Oxygen Demand	
Biochemical Oxygen Demand (5 days)	
Biochemical Oxygen Demand (20 days)	
Coliform, Total (MPN/100 mls.)	
Coliform, Fecal (MPN/100 mls.)	
Fecal Streptococcus (MPN/100 mls.)	
Total Plate Count (per ml.)	
Odor (Units)	
Color (Units)	
Specific Conductance (micromhos/cm.)	
Taste (Units)	
Turbidity (J.T.U.)	

REMARKS:

CLIENT: Pabst

Sampling:

Sampling was performed at each of the two location, Site A) Grove St. main 24" sewer line, Site B) 8" sewer line from building 6A, at house trap on sidewalk) for three twenty-four hour periods. Volumes were determined by measurement of the velocity of the effluent and the height of the water in the effluent pipe. Samples were collected and composited proportional to flow at the end of each 24 hr. period and analyzed separately. Temperature was taken once each day.

Physical Parameters:

		Day	
Site A	4-10-72	4-11-72	4-12-72
Flow avg.	779 gpm	790 gpm	819 gpm
Temperature	24°C.	21°C.	23°C.
Site B	4-14-72	4-17-72	4-18-72
Flow avg.	91.3 gpm	104.7 gpm	131.7 gpm
Temperature	24°C.	24°C.	23°C.

Sample 1	-	Site A	4-10
2	-	Site A	4-11
3	-	Site A	4-12
4	-	Site B	4-14
5	-	Site B	4-17
6	-	Site B	4-18

®

Client: Pabst **Report No.:** 67182 **Date:** May 10,

Sample No.: 1 **Description** Site A - 4/10/72

Sample No.: 2 **Description** Site A - 4/11/72

TEST	SAMPLE NO. 1	SAMPLE NO. 2
Acidity (as $CaCO_3$)		
Alkalinity, Total (as $CaCO_3$)		
Alkalinity		
Hydroxide		
Carbonate		
Bicarbonate		
Bromides		
Total Organic Carbon	563	814
Chemical Oxygen Demand (COD)	1940	2260
Chlorides	354	354
Chlorine Residual		
Chlorinated Hydrocarbons		
Cyanides		
Fluorides		
Hardness, Total		
Iodide		
Nitrogen		
Ammonia		
Nitrate		
Nitrite		
Kjeldahl		
il/Grease	33.2	230
pH (Units)	5.0	4.6
Phenols		
Phosphate, Total		
Silica, Dissolved		
Solids		
Total	1517	2817
Suspended	830	2370
Volatile	1229	1658
Total Dissolved	687	447
Volatile Suspended	445	1650
Settleable Solids		
Sulfates		
Sulfides		
Sulfites		
Total mineral suspended solids	385	720

TEST	SAMPLE 1	
Surfactants		
Aluminum		
Antimony		
Arsenic		
Beryllium		
Cadmium		
Calcium		
Chromium, Total	<.2	<
Chromium, Hexavalent	<.2	<
Cobalt		
Copper		
Iron		
Lead		
Magnesium		
Manganese		
Mercury		
Molybdenum		
Nickel		
Potassium		
Selenium		
Sodium		
Tin		
Titanium		
Zinc		
Immediate Oxygen Demand		
Biochemical Oxygen Demand (5 days)	3,400	4,
Biochemical Oxygen Demand (20 days)		
Coliform, Total (MPN/100 mls.)		
Coliform, Fecal (MPN/100 mls.)		
Fecal Streptococcus (MPN/100 mls.)		
Total Plate Count (per ml.)		
Odor (Units)		
Color (Units)		
Specific Conductance (micromhos/cm.)		
Taste (Units)		
Turbidity (J.T.U.)	190	3

REMARKS:

Note: All Results are given in mg./l. unless otherwise shown.

INC., OR ITS ...

714

FNC000048

UNITED STATES TESTING COMPANY, INC.

REPORT OF WATER AND WASTEWATER ANALYSIS

Client: Pabst Report No.: 67182 Date: May 10, 19

Sample No.: 3 Description Site A - 4/12/72

Sample No.: 4 Description Site B - 4/14/72

TEST	SAMPLE NO. 3	SAMPLE NO. 4	TEST	SAMPLE NO. 3	SAMPLE NO. 4
Acidity (as $CaCO_3$)			Surfactants		
Alkalinity, Total (as $CaCO_3$)			Aluminum		
Alkalinity			Antimony		
Hydroxide			Arsenic		
Carbonate			Beryllium		
Bicarbonate			Cadmium		
Bromides			Calcium		
Total Organic Carbon	491	15.3	Chromium, Total	<.2	<.
Chemical Oxygen Demand (COD)	1310	9.8	Chromium, Hexavalent	<.2	<.
Chlorides	425	9	Cobalt		
Chlorine Residual			Copper		
Chlorinated Hydrocarbons			Iron		
Cyanides			Lead		
Fluorides			Magnesium		
Hardness, Total			Manganese		
Iodide			Mercury		
Nitrogen			Molybdenum		
Ammonia			Nickel		
Nitrate			Potassium		
Nitrite			Selenium		
Kjeldahl			Sodium		
Oil/Grease	340	3.6	Tin		
pH (Units)	5.2	8.2	Titanium		
Phenols			Zinc		
Phosphate, Total			Immediate Oxygen Demand		
Silica, Dissolved			Biochemical Oxygen Demand (5 days)	3,700	6.
Solids			Biochemical Oxygen Demand (20 days)		
Total	2789	86	Coliform, Total (MPN/100 mls.)		
Suspended	630	52	Coliform, Fecal (MPN/100 mls.)		
Volatile	1491	29	Fecal Streptococcus (MPN/100 mls.)		
Total Dissolved	2159	34	Total Plate Count (per ml.)		
Volatile Suspended	470	40	Odor (Units)		
Settleable Solids			Color (Units)		
Sulfates			Specific Conductance (micromhos/cm.)		
Sulfides			Taste (Units)		
Sulfites			Turbidity (J.T.U.)	370	<18
Total Mineral Suspended Solids	160	12			

REMARKS:

FNC000049

Note: All Results are given in mg./l. unless otherwise shown.

UNITED STATES TESTING COMPANY, INC.

REPORT OF WATER AND WASTEWATER ANALYSIS

Client: Pabst Report No.: 67182 Date: May 10,

Sample No.: 5 Description Site B - 4/17/72

Sample No.: 6 Description Site B - 4/18/72

TEST	SAMPLE NO. 5	SAMPLE NO. 6
Acidity (as $CaCO_3$)		
Alkalinity, Total (as $CaCO_3$)		
Alkalinity		
Hydroxide		
Carbonate		
Bicarbonate		
Bromides		
Total Organic Carbon	14.2	10.4
Chemical Oxygen Demand (COD)	19.5	19.5
Chlorides	9	6
Chlorine Residual		
Chlorinated Hydrocarbons		
Cyanides		
Fluorides		
Hardness, Total		
Iodide		
ogen		
Ammonia		
Nitrate		
Nitrite		
Kjeldahl		
Oil/Grease	2.4	0.4
pH (Units)	8.0	8.6
Phenols		
Phosphate, Total		
Silica, Dissolved		
Solids		
Total	92	109
Suspended	19	27
Volatile	22	32
Total Dissolved	73	82
Volatile Suspended	14	26
Settleable Solids		
Sulfates		
Sulfides		
Sulfites		
Total Mineral Suspended Solids	5	1

TEST	SAMPLE 5	
Surfactants		
Aluminum		
Antimony		
Arsenic		
Beryllium		
Cadmium		
Calcium		
Chromium, Total	<.2	<
Chromium, Hexavalent	<.2	<
Cobalt		
Copper		
Iron		
Lead		
Magnesium		
Manganese		
Mercury		
Molybdenum		
Nickel		
Potassium		
Selenium		
Sodium		
Tin		
Titanium		
Zinc		
Immediate Oxygen Demand		
Biochemical Oxygen Demand (5 days)	5.6	8.
Biochemical Oxygen Demand (20 days)		
Coliform, Total (MPN/100 mls.)		
Coliform, Fecal (MPN/100 mls.)		
Fecal Streptococcus (MPN/100 mls.)		
Total Plate Count (per ml.)		
Odor (Units)		
Color (Units)		
Specific Conductance (micromhos/cm.)		
Taste (Units)		
Turbidity (J.T.U.)	<18	<18

REMARKS:

FNC000050

CLIENT: Pabst

Semi-Quantitative Analyses

	3	1	2	6	5	4
	1	2	3	4	5	6
Aluminum	m	ml 1%	m	ml	-	-
Arsenic	ND	-	-	ND	-	-
Antimony	ND	-	-	ND	-	-
Barium	ND	-	-	ND	-	-
Boron	t	t 0.1%	t	ml	ml	t
Bismuth	ND	-	-	ND	-	-
Cadmium	ND	-	-	ND	-	-
Calcium	ml	m	m	P	P. 100	P 100%
Chromium	ND	-	-	ND	-	-
Cobalt	ND	-	-	ND	-	-
Copper	ft <0.01%	-	-	ft	vft	ft
Iron	ml	Ml 10%	m	t	ft	ft
Lead	ND	ft <0.01%	ND	ND	-	-
Lithium	ND	-	-	ND	-	-
Magnesium	ml	m 1%	m	m	m	m
Manganese	tl 0.1%	-	-	ft	-	-
Molybdenum	ND	-	-	ND	-	-
Niobium	ND	-	-	ND	-	-
Nickel	ND	-	-	ND	-	-
Sodium	ml	m	M 10%	M	ml	m
Silicon	P	P 100%	P	M	Ml	M
	1517	2817	2789	86	92	57

FNC000051

C732

Semi-Quantitative Analyses - (Continued)

	1	2	3	4	5	6
Silver	ND	-	-	ft	ND	ft
Tantalum	ND	-	-	ND	-	-
Tin	ND	-	-	ND	-	-
Titanium	ml	-	-	tl	ND	ft
Tungsten	ND	-	-	ND	-	-
Vanadium	ND	-	-	ND	-	-
Zinc	ND	-	-	ND	-	-
Zirconium	ND	-	-	ND	-	-

Percent Total Solids

P	-	10 to 100%	*	-	Less than figure shown
M	-	1 to 10%	H	-	Upper half of range shown
m	-	.1 to 1.0%	L	-	Lower half of range shown
t	-	.01 to .1%	ND	-	Not detected
ft	-	less than 0.01%	ppm	-	Parts per million
vft	-	very faint trace	X	-	Not tested

United States Testing Company, Inc.

1415 PARK AVENUE • HOBOKEN, NEW JERSEY 07030 • 201-792-2400

REPORT OF TEST

67182
NUMBER
May 10, 1972

CLIENT: Pabst Brewing Corp.
Newark,
New Jersey

SUBJECT: Samples collected and identified by United States Testing Company representatives for analyses.

Project:

Wastewater collection and analyses in accordance with Passaic Valley Sewerage Commission effluent survey form.

Procedure:

Analyses:

The analyses were performed in accordance with Standard Methods for the Examination of Water and Wastewater, of the American Public Health Association, 13th edition, 1971.

FNC000053

SIGNED FOR THE COMPANY
BY E. Rider
E. Rider

ATTACHMENT 15

PASSAIC VALLEY SEWERAGE COMMISSIONERS

SEWER CONNECTION APPLICATION

PART I - SECTIONS A-C

Applicant is:
Corporation X
Partnership
Other

SECTION A: GENERAL INFORMATION

1. Company Name: Pabst Brewing Company

2. Location: 400 Grove Street
Newark, New Jersey Zip Code: 07106

3. Mailing Address: 400 Grove Street
Newark, New Jersey Zip Code: 07106

Name, title, address and telephone number of person to contact concerning information provided in this application:

4. Name of Contact Official: H.A. Blair
Title: Plant Engineer Phone No.: 201-373-6000

5. Address: 400 Grove Street, Newark, New Jersey 07106

6. Number of Employees - Full Time: 750 Part Time:

7. Number of Work Days Per Week: 7
Number of Shifts Per Day: 3
Is production seasonal? No If so, explain:

8. New Users Only: Indicate date user desires to commence operations:
N/A

9. If property is owned, indicate Lot and Block Numbers: Block 4001 Lot 2 Block 4002 LOt 30
Block 112, Lot 4
Block 160, Lot 11, Irvington 1979 Assessed Value: 9,469,000

10. If property is rented, indicate name and address of Landlord:
N/A

SECTION B: PRODUCT OR SERVICE INFORMATION

11. Brief description of manufacturing or other activity performed:
Brewing and Packaging Plant

12. Principal raw materials used: Water, Barley Malt, Corn, Hops and Yeast

13. Principal products or services: Packaged Beer

FNC000077

SECTION C: WATER DATA

14. Water Received: Year 1978 (Report Volume in Gallons)

	PURCHASED	WELL	RIVER	TOTAL
1st Qtr.	103,827,636	21,538,660	0	125,366,296
2nd Qtr.	146,299,824	20,808,612	0	167,108,436
3rd Qtr.	168,899,148	20,482,484	0	189,381,632
4th Qtr.	117,641,700	15,581,588	0	133,223,288

1978 GRAND TOTAL 615,079,652

NOTE: Cu. Ft. X 7.48 = Gallons

15. Name water supplier: City of Newark Account#: 01702597100

16. Is well water metered? Yes Is river water metered? N/A

17. Water Distribution: Year 1978 (Report Volume in Gallons)

Use (List totals in gallons per year)

(a) sanitary sewer (include industrial & domestic) 401,467,017

(b) separate storm sewer, river, or ditch. 106,215,000

(c) contained in product 73,472 815

(d) evaporation. 22,040,200

(e) waste haulers. 11,884,620

Name, Address & Registration Number of Waste Haulers Used
Yeast Products Inc. 25 Styertown Rd., Clifton, N.J. 07011
Univeral Grain Co., 425 South St. Newark, N.J. 07105

18. Is volume in 17 (a) measured? Partly How? Manning Meter

Certification:

The information contained in Part I of this application is familiar to me and, to the best of my knowledge and belief, such information is true, complete and accurate.

If the applicant is a corporation, a corporate resolution is attached granting me the authority to sign the application on behalf of the corporation.

Name of Signing Official: E.W. Ness

FNC000078

Title: Plant Manager

1-25-80
Date

E.W. Ness
Signature

PART II - SECTIONS D-F

These sections must be completed if the Applicant:

(a) discharges more than 25,000 gallons per day of either domestic and/or industrial wastes to the sanitary or combined sewer, or,

(b) discharges toxic wastes or wastes which can have a significant impact on the PVSC treatment works.

Questions regarding the applicability of this form to your facility may be answered by contacting the Industrial Department of PVSC at 344-1800.

Company Name: Pabst Brewing Company

Location: 400 Grove Street, Newark, N.J. 07106

SECTION D: OPERATIONAL CHARACTERISTICS

19. Discharge of industrial waste is continuous X or intermittent ____

20. Discharge of industrial waste occurs between the following hours: ____

N/A

21. Industrial Waste is, or may be discharged:

(a) only to the sanitary (or combined) sewer NA

(b) to both the sanitary (or combined) sewer and a separate storm sewer, river or ditch Yes

(c) NPDES Permit Number NJ 0028088

22. Describe seasonal variations, if any, giving dates, volumes, rates, hours, etc. Include variations in product lines which affect waste characteristics.

NA

23. Describe any pretreatment process in use: None

FNC000079

24. Describe any treatment process applied to raw water taken into the plant:

None

25. Describe any processes used to recycle water: None

(ATTACH ADDITIONAL SHEETS IF NECESSARY)

SECTION E: SEWER CONNECTION INFORMATION

26.

OUTLET * NUMBER	SEWER SIZE (INCHES)	DAILY FLOW (GALLONS)	CONTAINS INDUSTRIAL WASTE (YES OR NO)
	24	1,426,000	Yes

(ATTACH ADDITIONAL SHEETS IF NECESSARY)

Attach a plot plan of the property, showing:

(a) all existing or proposed sewer and drain lines (including outlets to a storm sewer, river or ditch);

(b) sample point(s);

(c) details of the connection(s) to the municipal (or PVSC) sewer, including the distance and direction of each connection from the nearest street intersection.

*If only one outlet, leave blank.

Number multiple outlets starting with 1.

FNC000080

SECTION F: ANALYSIS OF INDUSTRIAL WASTE

27. Analysis listed below is based on a composite sample of industrial waste taken from the following outlets listed in Section E:

Manhole #11 24 Hr. Flow Proportioned.

(See instructions for proportioning samples from more than one outlet)

28. Analytical Data: Concentration values are to be reported in mg/l (ppm) unless specified otherwise; analyze waste for those parameters marked with an asterisk (*), analyze waste for other parameters reasonably expected to be present. Code numbers are for internal use only.

REPORT TO THE NEAREST UNIT: X (EXAMPLE: 150 mg/l)

CODE	PARAMETER	VALUE
* 0100	Color (Apha Units)	300
0200	Radioactivity (PL-1)	
* 0500	Total Solids	3,705
* 0505	Total Volatile Solids	2,328
* 0510	Total Mineral Solids	1,377
* 0530	Total Suspended Solids	1,020
* 0540	Volatile Suspended Solids	780
* 0550	Mineral Suspended Solids	240
* 0070	Turbidity (JTU)	200
0550	Emulsified Oil or Grease	
* 0940	Chlorides	1.0
* 0945	Sulfates	32.8
* 0310	Biochemical Oxygen Demand (BOD)	2,004
* 0340	Chemical Oxygen Demand (COD)	3,733
* 0680	Total Organic Carbon (TOC)	2,000

REPORT TO THE NEAREST TENTH: 0.X (EXAMPLE 1.6 mg/l)

CODE	PARAMETER	VALUE
0745	Sulfide	
0740	Sulfite	
8260	Surfactants (MBAS)	
* 9000	pH (standard units) (range)	5.93-11.5
0625	Kjeldahl N as N	
0610	Ammonia as N	
0620	Nitrate as N	
0615	Nitrite as N	
0507	Ortho Phosphates as P	

FNC000081

REPORT TO THE NEAREST HUNDREDTH: 0.XX (EXCEPT WHERE INDICATED) (EXAMPLE: 0.36 mg/l)		
CODE	PARAMETER	VALUE
1097	Antimony (Sb)	
1002	Arsenic (As)	.002
1022	Boron (B)	
1027	Cadmium (Cd)	.009
1034	Chromium Total (Cr)	.164
1042	Copper (Cu)	.179
1045	Iron (Fe)	
1051	Lead (Pb)	.117

REPORT TO THE NEAREST HUNDREDTH: 0.XX (EXCEPT WHERE INDICATED) (EXAMPLE: 0.36 mg/l)		
CODE	PARAMETER	VALUE
1900	Mercury (Report to 0.XXX)	.0012
1067	Nickel (Ni)	.011
1147	Selenium (Se)	.024
1077	Siver (Ag)	
1102	Tin (Sn)	
1092	Zinc (Zn)	.801
4053	Pesticides (Report to 0.XXX)	
2730	Phenol	

29. Samples collected by: Elston T. Killiam Assoc. Date: 10/30-11/1/78

30. Samples analyzed by: U. Kim Date: 11-1-78 & 12-28-79

Products being manufactured when sample was collected: Malt Beverages

Certification:

The information contained in Part II of this application is familiar to me and, to the best of my knowledge and belief, such information is true, complete, and accurate.

If the applicant is a corporation, a corporate resolution is attached granting me the authority to sign the application on behalf of the corporation.

31. Name of Signing Official: E.W. Ness

Title: Plant Manager

1-25-80
Date

E.W. Ness
Signature

ATTACHMENT 16

Budget No. 158-R0106

000005

FOR AGENCY USE

NJ0028088

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
APPLICATION FOR PERMIT TO DISCHARGE WASTEWATER

STANDARD FORM C – MANUFACTURING AND COMMERCIAL

SECTION I. APPLICANT AND FACILITY DESCRIPTION

Unless otherwise specified on this form all items are to be completed. If an item is not applicable indicate 'NA.'

ADDITIONAL INSTRUCTIONS FOR SELECTED ITEMS APPEAR IN SEPARATE INSTRUCTION BOOKLET AS INDICATED. REFER TO BOOKLET BEFORE FILLING OUT THESE ITEMS.

Please Print or Type

Item		No.	Entry
1.	Legal Name of Applicant (see instructions)	101	Pabst Brewing Company
2.	Mailing Address of Applicant (see instructions) Number & Street	102a	917 West Juneau Avenue
	City	102b	Milwaukee
	State	102c	Wisconsin
	Zip Code	102d	53201
3.	Applicant's Authorized Agent (see instructions) Name and Title	103a	H. A. Blair Plant Engineer
	Number & Street Address	103b	400 Grove Street
	City	103c	Newark
	State	103d	New Jersey
	Zip Code	103e	07106
	Telephone	103f	201 (Area Code) 373-6000 (Number)
4.	Previous Application If a previous application for a National or Federal discharge permit has been made, give the date of application. Use numeric designation for date.	104	YR ___ MO ___ DAY ___

I certify that I am familiar with the information contained in this application and that to the best of my knowledge and belief such information is true, complete, and accurate.

J. J. Carew — Printed Name of Person Signing — 102e — Plant Manager — Title

J. J. Carew — Signature of Applicant or Authorized Agent — 102f — 75 YR 4 MO 21 DAY — Date Application Signed

18 U.S.C. Section 1001 provides that:

Whoever, in any matter within the jurisdiction of any department or agency of the United States knowingly and wilfully falsifies, conceals or covers up by any trick, scheme, or device a material fact, or makes any false, fictitious or fraudulent statement or representation, or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statement or entry, shall be fined not more than $10,000 or imprisoned not more than five years, or both.

FNC000054

FOR AGENCY USE

Received ___ YR ___ MO ___ DAY ___

OFFICE: ___ EPA Region Number
___ State

			FOR AGENCY USE
5. **Facility/Activity** (see instructions). Give the name, ownership, and physical location of the plant or other operating facility where discharge(s) does or will occur.			
Name	105a	Pabst Brewing Company	
Ownership (Public, Private or Both Public and Private)	105b	[X] PUB ☐ PRV ☐ BPP	
Check block if Federal Facility and give GSA Inventory Control Number	105c	☐ FED	
	105d		
Location			
Street & Number	105e	400 Grove Street	
City	105f	Newark	
County	105g	Essex	
State	105h	New Jersey	
6. **Nature of Business** State the nature of the business conducted at the plant or operating facility.	106a	Malt Beverages	
	106b	AGENCY USE	
7. **Facility Intake Water** (see instructions) Indicate water intake volume per day by sources. Estimate average volume per day in thousand gallons per day.			
Municipal or private water system	107a	1502.96 thousand gallons per day	
Surface water	107b	N.A. thousand gallons per day	
Groundwater	107c	450.67 thousand gallons per day	
Other*	107d	N.A. thousand gallons per day	
Total Item 7	107e	1953.63 thousand gallons per day	
*If there is intake water from 'other,' specify the source.	107f		
8. **Facility Water Use** Estimate average volume per day in thousand gallons per day for the following types of water usage at the facility. (see instructions)			
Noncontact cooling water	108a	158.1 thousand gallons per day	
Boiler feed water	108b	12.8 thousand gallons per day	
Process water (including contact cooling water)	108c	1764.73 thousand gallons per day	
Sanitary water	108d	18 thousand gallons per day	
Other*	108e	N.A. thousand gallons per day	
Total Item 8	108f	1953.63 thousand gallons per day	
*If there are discharges to 'other,' specify.	108g		
If there is 'Sanitary' water use, give the number of people served.	108h	900 people served	

FNC000055

EPA Form 7550-23 (7-73)

FOR AGENCY USE

9. **All Facility Discharges and other Losses; Number and Discharge (see instructions) Volume** Specify the number of discharge points and the volume of water discharged or lost from the facility according to the categories below. Estimate average volume per day in thousand gallons per day.

		Number of Discharge Points		Total Volume Used or Discharged, Thousand Gal/Day
Surface Water	109a1	N.A.	109a2	N.A.
Sanitary wastewater transport system	109b1	1	109b2	1407.37
Storm water transport system	109c1	1	109c2	158.1
Combined sanitary and storm water transport system	109d1	N.A.	109d2	N.A.
Surface impoundment with no effluent	109e1	N.A.	109e2	N.A.
Underground percolation	109f1	N.A.	109f2	N.A.
Well injection	109g1	N.A.	109g2	N.A.
Waste acceptance firm	109h1	2	109h2	38.17
Evaporation	109i1	15	109i2	81.98
Consumption	109j1	1	109j2	268.01
Other*	109k1	N.A.	109k2	N.A.
Facility discharges and volume Total Item 9.	109l1	20	109l2	1953.63
*If there are discharges to 'other,' specify.	109m1			

10. **Permits, Licenses and Applications**
List all existing, pending or denied permits, licenses and applications related to discharges from this facility (see instructions).

110	Issuing Agency (a)	For Agency Use (b)	Type of Permit or License (c)	ID Number (d)	Date Filed YR/MO/DA (e)	Date Issued YR/MO/DA (f)	Date Denied YR/MO/DA (g)	Expiration Date YR/MO/DA (h)
1.	USEPA		Short Form C	NJ 0028088	73/4/4	–	–	–
2.	USEPA		Short Form C Amended	NJ 0028088	74/12/23	–	–	–
3.								

11. **Maps and Drawings**
Attach all required maps and drawings to the back of this application. (see instructions)

12. **Additional Information**

112 Item Number	Information
	FNC000056

OMB No. 158-R0100

FOR AGENCY USE

STANDARD FORM C – MANUFACTURING AND COMMERCIAL

SECTION II. BASIC DISCHARGE DESCRIPTION

Complete this section for each discharge indicated in Section I, Item 9, that is to surface waters. This includes discharges to municipal sewerage systems in which the wastewater does not go through a treatment works prior to being discharged to surface waters. Discharges to wells must be described where there are also discharges to surface waters from this facility. SEPARATE DESCRIPTIONS OF EACH DISCHARGE ARE REQUIRED EVEN IF SEVERAL DISCHARGES ORIGINATE IN THE SAME FACILITY. All values for an existing discharge should be representative of the twelve previous months of operation. If this is a proposed discharge, values should reflect best engineering estimates.

ADDITIONAL INSTRUCTIONS FOR SELECTED ITEMS APPEAR IN SEPARATE INSTRUCTION BOOKLET AS INDICATED. REFER TO BOOKLET BEFORE FILLING OUT THESE ITEMS.

1. **Discharge Serial No. and Name**
   a. **Discharge Serial No.** (see instructions) — 201a: 001
   b. **Discharge Name** Give name of discharge, if any. (see instructions) — 201b: South Orange Avenue Storm Sewer
   c. **Previous Discharge Serial No.** If previous permit application was made for this discharge (see Item 4, Section I), provide previous discharge serial number. — 201c: N.A.
2. **Discharge Operating Dates**
   a. **Discharge Began Date** If the discharge described below is in operation, give the date (within best estimate) the discharge began. — 202a: 65 YR 8 MO
   b. **Discharge to Begin Date** If the discharge has never occurred but is planned for some future date, give the date (within best estimate) the discharge will begin. — 202b: YR MO
   c. **Discharge to End Date** If discharge is scheduled to be discontinued within the next 5 years, give the date (within best estimate) the discharge will end. — 202c: YR MO
3. **Engineering Report Available** Check if an engineering report is available to reviewing agency upon request. (see instructions) — 203 ☐
4. **Discharge Location** Name the political boundaries within which the point of discharge is located.

				Agency Use
State	204a	New Jersey	204d	
County	204b	Essex	204e	
(if applicable) City or Town	204c	Newark	204f	

5. **Discharge Point Description** Discharge is into (check one): (see instructions)
   - Stream (includes ditches, arroyos, and other intermittent watercourses) — 205a ☐ STR
   - Lake ☐ LKE
   - Ocean ☐ OCE
   - Municipal Sanitary Wastewater Transport System ☐ MTS

FNC000057

DISCHARGE SERIAL NUMBER

001

FOR AGENCY USE

Municipal Storm Water Transport System		☒ STS
Well (Injection)		☐ WEL
Other		☐ OTH
If 'other' is checked, specify	205b	
6. Discharge Point — Lat/Long Give the precise location of the point of discharge to the nearest second.		
Latitude	206a	____DEG ____MIN ____SEC
Longitude	206b	____DEG ____MIN ____SEC
7. Discharge Receiving Water Name Name the waterway at the point of discharge.(see instructions)	207a	Maybaum Creek - Rahway River
If the discharge is through an outfall that extends beyond the shoreline or is below the mean low water line, complete Item 8.	207b	For Agency Use: Major / Minor / Sub; 207c; For Agency Use: 303e
8. Offshore Discharge		
a. Discharge Distance from Shore	208a	N.A. feet
b. Discharge Depth Below Water Surface	208b	____ feet
Discharge Type and Occurrence		
a. Type of Discharge Check whether the discharge is continuous or intermittent. (see instructions)	209a	☒ (con) Continuous ☐ (int) Intermittent
b. Discharge Occurrence Days per Week Enter the average number of days per week (during periods of discharge) this discharge occurs.	209b	6-7 days per week
c. Discharge Occurrence —Months If this discharge normally operates (either intermittently, or continuously) on less than a year-around basis (excluding shutdowns for routine maintenance), check the months during the year when the discharge is operating. (see instructions)	209c	☐ JAN ☐ FEB ☐ MAR ☐ APR ☐ MAY ☐ JUN ☐ JUL ☐ AUG ☐ SEP ☐ OCT ☐ NOV ☐ DEC
Complete Items 10 and 11 if "Intermittent" is checked in Item 9.a. Otherwise, proceed to Item 12.		
10. Intermittent Discharge Quantity State the average volume per discharge occurrence in thousands of gallons.	210	N.A. thousand gallons per discharge occurrence.
11. Intermittent Discharge Duration and Frequency		
a. Intermittent Discharge Duration Per Day State the average number of hours per day the discharge is operating.	211a	N.A. hours per day
b. Intermittent Discharge Frequency State the average number of discharge occurrences per day during days when discharging.	211b	N.A. discharge occurrences per day
12. Maximum Flow Period Give the time period in which the maximum flow of this discharge occurs	212	From N.A. (month) to ____ (month)

FNC000058

001

FORM APPROVED
OMB No. 158–R0100

FOR AGENCY USE

13. Activity Description Give a narrative description of activity producing this discharge.(see instructions)

213a Non-Contact cooling water.

14. Activity Causing Discharge For each SIC Code which describes the activity causing this discharge, supply the type and maximum amount of either the raw material consumed (Item 14a) or the product produced (Item 14b) in the units specified in Table I of the Instruction Booklet. For SIC Codes not listed in Table I, use raw material or production units normally used for measuring production.(see instructions)

SIC 4930

a. **Raw Materials**

	SIC Code	Name	Maximum Amount/Day	Unit (See Table I)	Shared Discharges (Serial Number)
214a	(1)	(2)	(3)	(4)	(5)

b. **Products**

	SIC Code	Name	Maximum Amount/Day	Unit (See Table I)	Shared Discharges (Serial Number)
214b	(1)	(2)	(3)	(4)	(5)

FNC000059

FOR AGENCY USE

15. Waste Abatement

a. **Waste Abatement Practices**
Describe the waste abatement practices used on this discharge with a brief narrative. (see instructions)

215a Narrative: N.A.

b. **Waste Abatement Codes**
Using the codes listed in Table II of the Instruction Booklet, describe the waste abatement processes for this discharge in the order in which they occur if possible.

215b (1) Nonone , (2) , (3) ,
(4) , (5) , (6) ,
(7) , (8) , (9) ,
(10) , (11) , (12) ,
(13) , (14) , (15) ,
(16) , (17) , (18) ,
(19) , (20) , (21) ,
(22) , (23) , (24) ,
(25)

FNC000060

DISCHARGE SERIAL NUMBER

001

OMB No.

FOR AGENCY USE

16. Wastewater Characteristics

Check the box beside each constituent which is present in the effluent (discharge water). This determination is to be based on actual analysis or best estimate.(see Instructions)

Parameter 216	Present	Parameter 216	Present
Color 00080		Copper 01042	
Ammonia 00610		Iron 01045	
Organic nitrogen 00605		Lead 01051	
Nitrate 00620		Magnesium 00927	
Nitrite 00615		Manganese 01055	
Phosphorus 00665		Mercury 71900	
Sulfate 00945		Molybdenum 01062	
Sulfide 00745		Nickel 01067	
Sulfite 00740		Selenium 01147	
Bromide 71870		Silver 01077	
Chloride 00940		Potassium 00937	
Cyanide 00720		Sodium 00929	
Fluoride 00951		Thallium 01059	
Aluminum 01105		Titanium 01152	
Antimony 01097		Tin 01102	
Arsenic 01002		Zinc 01092	
Beryllium 01012		Algicides* 74051	
Barium 01007		Chlorinated organic compounds* 74052	
Boron 01022		Pesticides* 74053	
Cadmium 01027		Oil and grease 00550	
Calcium 00916		Phenols 32730	
Cobalt 01037		Surfactants 38260	
Chromium 01034		Chlorine 50060	
Fecal coliform bacteria 74055		Radioactivity* 74050	

*Specify substances, compounds and/or elements in Item 26.

Pesticides (insecticides, fungicides, and rodenticides) must be reported in terms of the acceptable common names specified in *Acceptable Common Names and Chemical Names for the Ingredient Statement on Pesticide Labels*, 2nd Edition, Environmental Protection Agency, Washington, D.C. 20250, June 1972, as required by Subsection 162.7(b) of the Regulations for the Enforcement of the Federal Insecticide, Fungicide, and Rodenticide Act.

DISCHARGE SERIAL NUMBER

001

FOR AGENCY USE

Description of Intake and Discharge

For each of the parameters listed below, enter in the appropriate box the value or code letter answer called for.(see instructions)

In addition, enter the parameter name and code and all required values for any of the following parameters if they were checked in Item 16: ammonia, cyanide, aluminum, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, zinc, phenols, oil and grease, and chlorine (residual).

Parameter and Code 217a	Influent		Effluent					
	Untreated Intake Water (Daily Average) (1)	In-Plant Treated Intake Water (Daily Average) (2)	Daily Average (3)	Minimum Value Observed or Expected During Discharge Activity (4)	Maximum Value Observed or Expected During Discharge Activity (5)	Frequency of Analysis (6)	Number of Analyses (7)	Sample Type (8)
Flow* Gallons per day 00056	1,502,958	N.A.	158,098			See Note	Item 26	
pH Units 00400	8	N.A.	X					
Temperature (winter) °F 74028	36	N.A.	71.6					
Temperature (summer) °F 74027	68	N.A.	Not Available					
Biochemical Oxygen Demand (BOD 5-day) mg/l 00310	1.2	N.A.	5.2					
Chemical Oxygen Demand (COD) mg/l 00340	0	N.A.	68					
Total Suspended (nonfilterable) ? Solids mg/l 00530	1	N.A.	131					
Specific Conductance micromhos/cm at 25° C 00095	103	N.A.	X					
Settleable Matter (residue) ml/l 00545	0	N.A.	18					

*Other discharges sharing intake flow (serial numbers).(see instructions)

FNC000062

DISCHARGE SERIAL NUMBER
001

FOR AGENCY USE

17. (Cont'd.)

Parameter and Code 217a	Influent: Untreated Intake Water (Daily Average) (1)	Influent: In-Plant Treated Intake Water (Daily Average) (2)	Effluent: Daily Average (3)	Effluent: Minimum Value Observed or Expected During Discharge Activity (4)	Effluent: Maximum Value Observed or Expected During Discharge Activity (5)	Effluent: Frequency of Analysis (6)	Effluent: Number of Analyses (7)	Effluent: Sample Type (8)

18. Plant Controls Check if the following plant controls are available for this discharge. **218** N.A.

Alternate power source for major pumping facility. ☐ APS

Alarm or emergency procedure for power or equipment failure ☐ ALM

Complete item 19 if discharge is from cooling and/or steam water generation and water treatment additives are used.

19. Water Treatment Additives If the discharge is treated with any conditioner, inhibitor, or algicide, answer the following:

a. Name of Material(s) **219a** N.A.

b. Name and address of manufacturer **219b**

c. Quantity (pounds added per million gallons of water treated). **219c**

FNC000063

DISCHARGE SERIAL NUMBER
001

FOR AGENCY USE

d. Chemical composition of these additives (see instructions). | 219d | ______

Complete items 20-25 if there is a thermal discharge (e.g., associated with a steam and/or power generation plant, steel mill, petroleum refinery, or any other manufacturing process) and the total discharge flow is 10 million gallons per day or more. (see instructions)

N.A.

20. Thermal Discharge Source Check the appropriate item(s) indicating the source of the discharge. (see instructions) | 220

Boiler Blowdown	☐ BLBD
Boiler Chemical Cleaning	☐ BCCL
Ash Pond Overflow	☐ APOF
Boiler Water Treatment — Evaporator Blowdown	☐ EPBD
Oil or Coal Fired Plants — Effluent from Air Pollution Control Devices	☐ OCFP
Condense Cooling Water	☐ COND
Cooling Tower Blowdown	☐ CTBD
Manufacturing Process	☐ MFPR
Other	☐ OTHR

21. Discharge/Receiving Water Temperature Difference

Give the maximum temperature difference between the discharge and receiving waters for summer and winter operating conditions. (see instructions)

Summer | 221a | ______ °F.

Winter | 221b | ______ °F.

22. Discharge Temperature, Rate of Change Per Hour | 222 | ______ °F./hour

Give the maximum possible rate of temperature change per hour of discharge under operating conditions. (see instructions)

23. Water Temperature, Percentile Report (Frequency of Occurrence)

In the table below, enter the temperature which is exceeded 10% of the year, 5% of the year, 1% of the year and not at all (maximum yearly temperature). (see instructions)

Frequency of occurrence		10%	5%	1%	Maximum
a. Intake Water Temperature (Subject to natural changes)	223a	°F	°F	°F	°F
b. Discharge Water Temperature	223b	°F	°F	°F	°F

24. Water Intake Velocity (see instructions) | 224 | ______ feet/sec.

25. Retention Time Give the length of time, in minutes, from start of water temperature rise to discharge of cooling water. (see instructions) | 225 | ______ minutes

FNC000064

DISCHARGE SERIAL NUMBER

001

FOR AGENCY USE

26. Additional Information

226 Item	Information
16	Effluent is municipal water used for non-contacting cooling and none of these constitutents are added.
17	DATA based on analysis of continuous 24 hour sample taken 3/27/75.

FNC000065

FORM APPROVED
OMB No. 158–R0100

FOR AGENCY USE

STANDARD FORM C – MANUFACTURING AND COMMERCIAL

SECTION III. WASTE ABATEMENT REQUIREMENTS & IMPLEMENTATION (CONSTRUCTION) SCHEDULE

This section requires information on any uncompleted implementation schedule which may have been imposed for construction of waste abatement facilities. Such requirements and implementation schedules may have been established by local, State, or Federal agencies or by court action. In addition to completing the following items, a copy of an official implementation schedule should be attached to this application. IF YOU ARE SUBJECT TO SEVERAL DIFFERENT IMPLEMENTATION SCHEDULES, EITHER BECAUSE OF DIFFERENT LEVELS OF AUTHORITY IMPOSING DIFFERENT SCHEDULES (Item 1a.) AND/OR STAGED CONSTRUCTION OF SEPARATE OPERATION UNITS (Item 1c), SUBMIT A SEPARATE SECTION III FOR EACH ONE.

FOR AGENCY USE

SCHED. NO. ______

1. Improvements — 300 — N.A.

a. Discharge Serial Number Affected List the discharge serial numbers, assigned in Section II, that are covered by this implementation schedule. — 301a — ____, ____, ____, ____, ____, ____

b. Authority Imposing Requirements Check the appropriate item indicating the authority for implementation schedule. If the identical implementation schedule has been ordered by more than one authority, check the appropriate items. (see instructions)

	301b	
Locally developed plan		☐LOC
Areawide Plan		☐ARE
Basic Plan		☐BAS
State approved implementation schedule		☐SQS
Federal approved water quality standards implementation plan.		☐WQS
Federal enforcement procedure or action		☐ENF
State court order		☐CRT
Federal court order		☐FED

c. Facility Requirement. Specify the 3-character code of those listed below that best describes in general terms the requirement of the implementation schedule and the applicable six-character abatement code(s) from Table II of the Instruction booklet. If more than one schedule applies to the facility because of a staged construction schedule, state the stage of construction being described here with the appropriate general action code. Submit a separate Section III for each stage of construction planned.

301c — 3-character (general) ______

301d — 6-character (specific) (see Table II) ______ ______ ______

New Facility	NEW
Modification (no increase in capacity or treatment)	MOD
Increase in Capacity	INC
Increase in Treatment Level	INT
Both Increase in Treatment Level and Capacity	ICT
Process Change	PRO
Elimination of Discharge	ELI

FNC000066

FOR AGENCY USE

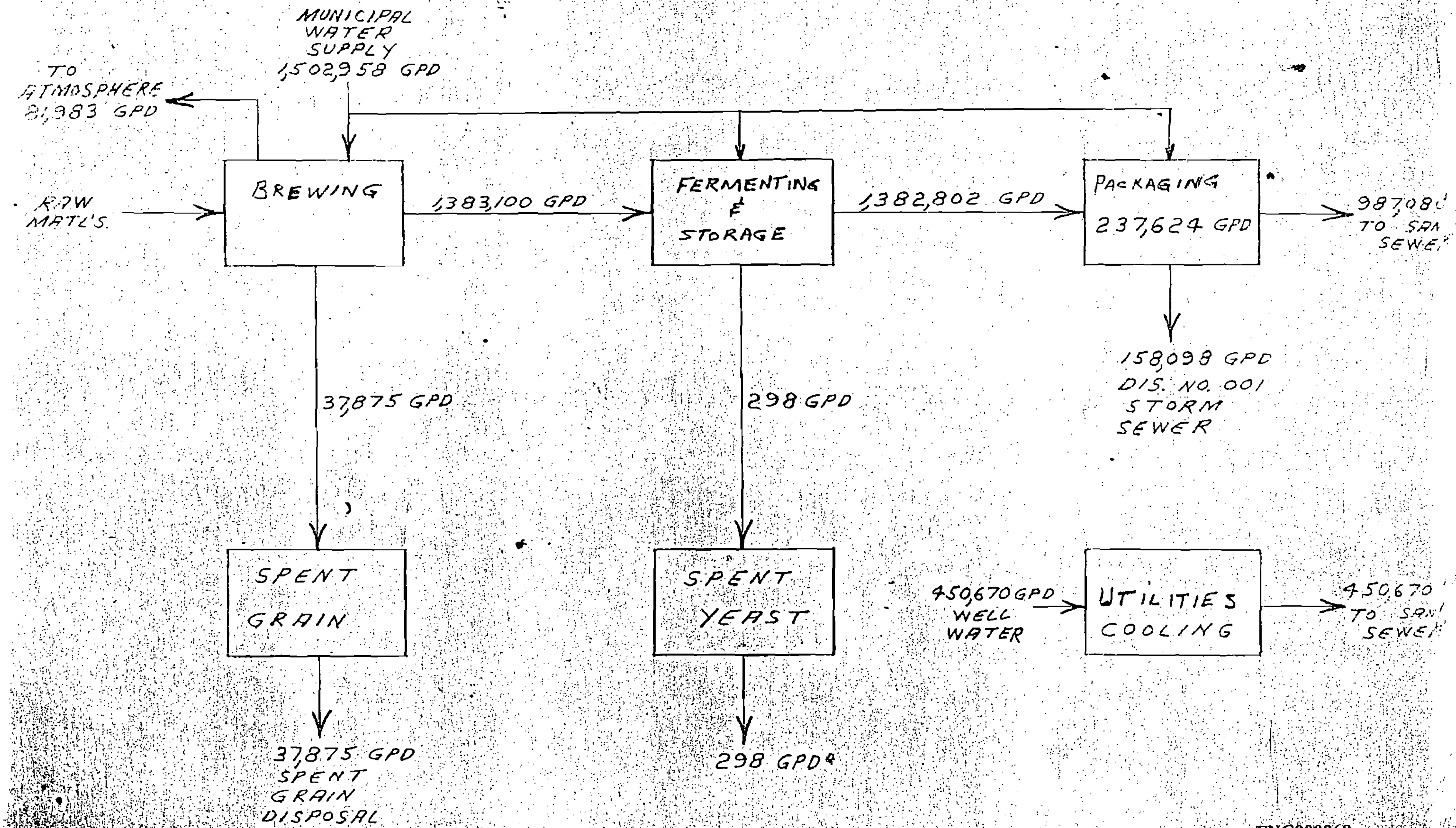
2. Implementation Schedule and 3. Actual Completion Dates

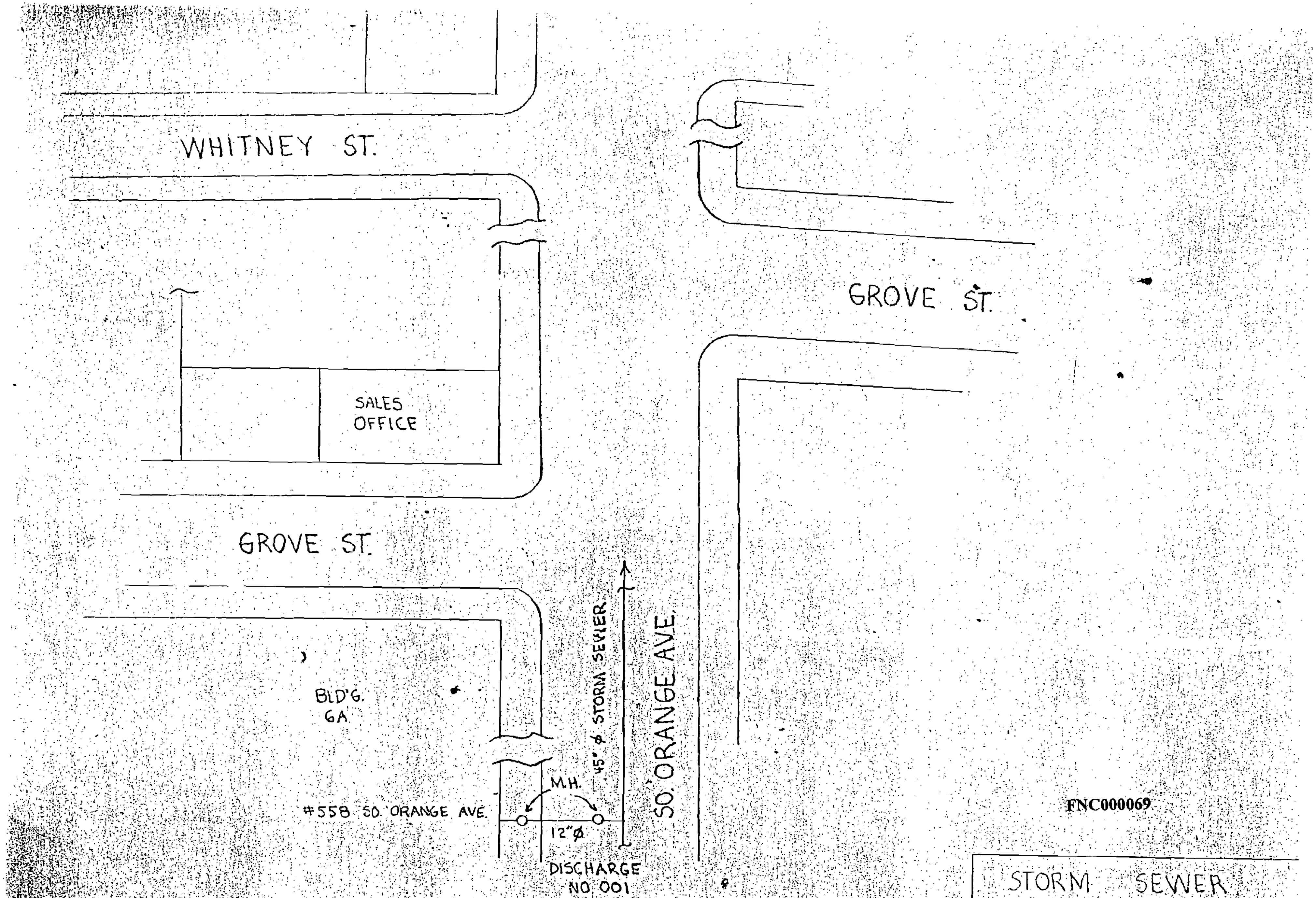
Provide dates imposed by schedule and any actual dates of completion for implementation steps listed below. Indicate dates as accurately as possible. (see instructions)

Implementation Steps		2. Schedule (Yr./Mo./Day)		3. Actual Completion (Yr./Mo./Day)
a. Preliminary plan complete	302a	___/___/___	303a	___/___/___
b. Final plan submission	302b	___/___/___	303b	___/___/___
c. Final plan complete	302c	___/___/___	303c	___/___/___
d. Financing complete & contract awarded	302d	___/___/___	303d	___/___/___
e. Site acquired	302e	___/___/___	303e	___/___/___
f. Begin action (e.g., construction)	302f	___/___/___	303f	___/___/___
g. End action (e.g., construction)	302g	___/___/___	303g	___/___/___
h. Discharge Began	302h	___/___/___	303h	___/___/___
i. Operational level attained	302i	___/___/___	303i	___/___/___

FNC000067

SCHEMATIC OF WATER FLOW
PABST BREWING COMPANY
NEWARK, ESSEX, NEW JERSEY
APRIL 21, 1975





FNC000069

STORM SEWER CONNECTION	
DWN. W. SMITH	DATE 11-21-75
APPROV.	SCALE 1"=40'

ATTACHMENT 17

Utilization Potential of Brewery Waste Water Sludge as an Organic Fertilizer

K. Kanagachandran[1,3] and R. Jayaratne[2]

ABSTRACT

J. Inst. Brew. 112(2), 92–96, 2006

Brewery waste water sludge (BWS) is produced as the result of aerobic biological treatment of brewery effluent. Analysis of this waste material revealed that it contained valuable nutrients for plant growth with high water retention. Germination and plant growth trials were carried out with chili and pumpkin. The potential of applying sun dried brewery waste water sludge and admixing with two different types of compost were evaluated and outlined in this paper.

Key words: Brewery waste water sludge, compost, germination water retention.

INTRODUCTION

The brewing industry is one of the largest industrial users of water. Even though substantial technological improvements have been made in the past, it has been documented that approximately 3 to 10 litres of waste effluent is generated per litre of beer produced in breweries[3]. Brewery effluent is a waste material discharged to the drains. The high organic content of brewery effluent classifies it as a very high strength waste in terms of chemical oxygen demand, from 1000 mg/L to 4000 mg/L and biochemical oxygen demand of up to 1500 mg/L. The treatment of brewery waste water effluent is a costly affair for the brewer in order to meet the government regulations and to practice environmentally friendly manufacturing[8]. Biological treatment is widely applied and two treatment options are available. Generally, aerobic treatment has been applied for the treatment of brewery waste water and recently anaerobic systems have become an attractive option[5,6]. The aerobic treatment of brewery effluent requires a comparatively large energy input compared to anaerobic treatment. During the aerobic process, complex organic substances are completely oxidised to carbon dioxide, water, sulphate, phosphate and nitrate by a community of microorganisms dominated by heterotrophic bacteria (bacteria requiring organic compounds for their carbon energy source) and fungi. Furthermore, since it is an oxidative biological reaction, large amounts of biomass are produced which settle as sludge which requires further disposal. The common disposal route for brewery waste water sludge has been landfill. The treatment of organic solid waste is currently a growing area of investigation as new options, that substitute the conventional treatment system, are explored. Due to increasing environmental concerns and regulations, there have been attempts to utilize this brewery by product in an environmentally friendly manner[1,2,5–7,9,10]. In developing countries, non-utilization of by products is a drag on economic growth and businesses and the business community is increasingly recognizing the potential. This paper investigates the application of brewery waste water sludge (BWS) as an organic fertilizer in agriculture.

[1] The Lion brewery Ceylon Ltd, 254, Colombo Road, Biyagama, Sri Lanka.
[2] Solid waste Management Holdings (Pvt) Ltd, 286 2/1, Galle Road, Colombo 03, Sri Lanka.
[3] Corresponding author. E-mail: kanagachandran@hotmail.com

Publication no. G-2006-0619-434

MATERIALS AND METHODS

The BWS was sun dried to obtain dry substrate and seed germination and plant growth trials were conducted to evaluate the application of brewery waste water sludge as an organic fertilizer, both on its own and in combination with either compost-A (derived from municipal solid waste) or compost-B (derived from farm wastes).

Germination trials with pumpkin seeds

Dried BWS was mixed with different proportions of either compost-A or compost-B as described in Table I.

Three volumes of the above treatments or BWS or compost-A or compost-B were added to seven volumes of river sand and mixed thoroughly. These mixtures (400 g) were transferred into plastic cups (500 mL) with holes in the bottom surface and five seeds of pumpkin (East West Seeds International, Nonthaburi, Thailand) were sown into each cup. Six replicates were conducted for each type of treatment, waste water sludge, compost 'A' and compost 'B'. Each cup was watered with 40 mL of tap water per day and kept in an open area with sufficient sunlight for 24 days.

TABLE I. Proportion of compost and BWS in mixtures.

Treatment number	Compost (% by volume)	Brewery waste water sludge (% by volume)
1	90	10
2	80	20
3	70	30
4	50	50
5	20	80
6	10	90

Germination trials with chili seeds

Three volumes of the above treatments (mixture of BWS and compost B as shown in Table I) 2, 3, 4 or BWS or compost-B were added to seven volumes of river sand and mixed thoroughly. These mixtures (400 g) were transferred into plastic cups (500 mL) with holes in the bottom surface and five seeds of chili (Best Seeds Co. (Pvt) Ltd, Rajagiriya, Sri Lanka) were sown into each cup. Six replicates were conducted for each type of treatment, waste water sludge and compost 'B'. Each cup was watered with 40 mL of tap water per day and kept in an open area with sufficient sunlight for 69 days.

Plant growth field trials

A programme of comparative plant growth field trials using BWS, compost-A, compost-B and selected mixtures of BWS and both types of composts to evaluate the quality and growth promoting ability of the BWS was carried out. Beds (0.9 m × 3.2 m) were prepared at the brewery premises and the appropriate composts and BWS/compost mixtures were applied to the soil (500 g/square meter) and mixed thoroughly. Twelve chili seeds (Best Seeds Co. (Pvt) Ltd, Rajagiriya, Sri Lanka) were sown per bed, according to the recommended planting distance (60 cm 45 cm) of the department of Agriculture, Sri Lanka. On the forty seventh day and seventieth day 15 g and 50 g of appropriate composts and BWS/compost mixtures were applied per plant respectively. The beds were watered daily with same amount of tap water for 100 days.

Measurement of water retention capacity

Water retention, which is an important property for agricultural and horticultural applications of BWS was compared with compost 'A', compost 'B' and sand. Aliquots of 140 g of BWS or compost 'A', compost 'B' or sand were transferred into plastic cups (500 mL) with holes in the bottom surface. Tap water (500 mL) was added to each of the cups containing the relevant samples and the water was allowed to drain. The cups were kept at ambient temperature and weights were recorded on a daily basis until a constant weight was obtained. Five replicates were conducted for each type of sample.

Measurement of pH

One volume of sample (10 mL) was mixed with five volumes of distilled water (50 mL) and left for two hours at ambient temperature. The pH of this solution was measured with a digital pH meter (Jenway 3510, Essex, England).

Analysis of compost and brewery waste water sludge

Chemical and physical parameters were analysed using methods as described by Sri Lankan Standards Institution (Sri Lanka standard 1246:2003 UDC.628.477.4).

Dry weight measurement

Plants were removed carefully from the soil and the roots were washed thoroughly with tap water and dried at 105°C (WTC Binder-7200 Oven, Tuttlingen, Germany) until a constant weight was obtained. Chilies were also removed from the plants and the dry weights were determined as above.

Analysis of minerals and heavy metals

The mineral and heavy metal contents were determined as described by the Sri Lankan standards Institution (Sri Lanka standard 1246:2003 UDC.628.477.4).

RESULTS AND DISCUSSION

Sun dried BWS, composts A and B were analysed for both chemical and physical parameters. The availability of nutrients was determined. The results are summarised in Table II.

The pH of BWS was more towards neutral whereas both types of composts studied appeared to be alkali. Previous work by Luque *et al.*[7] demonstrated that the pH of BWS from three South American breweries varied from 6.5 to 11.5. This could be mainly due to differences of the raw water used and certain process variations in the waste water treatment plants. The organic carbon and total nitrogen content of BWS was higher than that of both composts derived from municipal wastes and farm yard wastes (Table II). It has been established that many ectomycorrhizal fungi can take up organic nutrients directly from soil and play vital symbiotic roles in plant nutrition and ecosystem functioning. Recent investigations reveal that these fungi lose their ability to grow and break down forms of organic nitrogen when exposed to elevated levels of inorganic nitrogen[4]. In addition composts prepared with BWS had the highest population of fungi and actinomycetes[2]. Thus BWS could be a better alternative for inorganic fertilizers in agricultural applications. The total phosphorous content of the BWS was almost the same as in farm yard compost. Furthermore, potassium and the micronutrients manganese, copper and zinc were low in BWS compared to the two types of composts studied. One of the main hurdles in the agricultural application of waste water sludge has been the presence of heavy metals

TABLE II. Analysis of dry BWS and composts A and B.

Parameter	BWS	Compost A	Compost B
Moisture (%)	10.70	13.20	15.83
pH	6.97	8.64	8.40
Volatile matter (%)	9.0	12.5	9.0
Organic carbon (%)	27.1	9.8	18.3
Total nitrogen (%)	4.5	1.1	1.6
Available nitrogen (%)	0.4	0.4	0.2
Total P (as P_2O_5) (%)	3.3	0.6	3.2
Citric acid soluble P (%)	1.4	0.4	1.6
Potassium as K_2O (%)	0.2	0.7	2.7
Manganese (mg/kg)	46	231	495
Magnesium (mg/kg)	1106	102	2813
Zinc (mg/kg)	75	272	100
Copper (mg/kg)	42	354	203

TABLE III. Analysis of heavy metals in dry BWS.

Metal	Concentration (mg/kg)
Mercury	Not detected (detection limit 0.02 mg/kg)
Cadmium	Not detected (detection limit 0.02 mg/kg)
Lead	2.9
Nickel	17

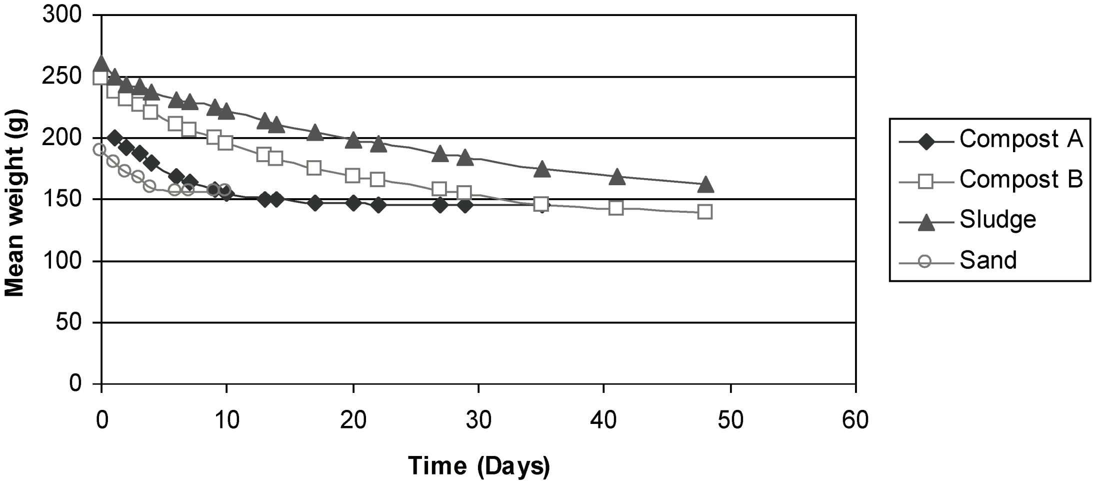


Fig. 1. Water retention over time.

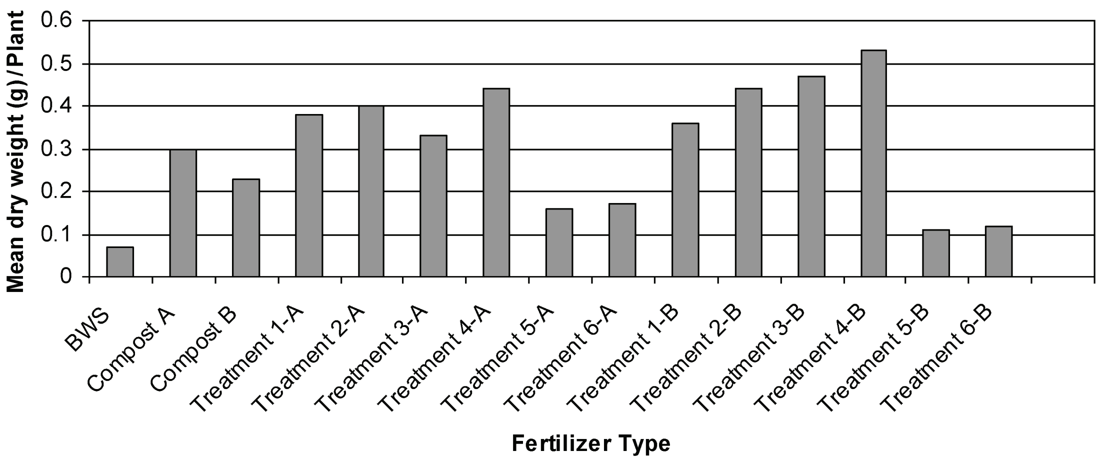


Fig. 2. Summary of results of pumpkin seed germination trials. (See Table I for treatment details.)

and the consequent toxic effects on crops and soil, and the leaching of heavy metals into nearby water sources. The analysis of selected heavy metals in BWS is tabulated in Table III. The results revealed that mercury and cadmium were well below the detection level and that lead and nickel were lower than expected in the Sri Lankan standards for organic fertilizer which are 250 mg/Kg and 100 mg/Kg respectively.

Water retention is a valuable property and important in soil for releasing the humidity to the plants as needed. Thus water retention of BWS was compared with both types of composts and sand. During a period of fifty days, BWS demonstrated the highest water retention capacity followed by Compost B and compost A (Fig. 1). This property of BWS has been linked to the high content of organic matter, the high cationic exchange capacity and other nutrients as documented by Luque *et al*[7].

Germination studies of pumpkin and chili seeds were performed to compare and evaluate BWS and mixtures of BWS and both types of composts at different proportions. The mean dry weights of pumpkin and chili plants are shown in Figs. 2 and 3 respectively. This investigation demonstrated that the pumpkin seeds sown in combinations of BWS and composts showed elevated growth compared to the ones on BWS or composts alone (Fig. 2). Furthermore dry weight increased with increasing proportions of BWS up to 50% by volume (Fig. 2 and Table I). Further increases in the content of BWS in the fertilizer mixture resulted in the reduction of dry weights of pumpkin plants. Addition of 50% BWS by volume to compost A and compost B resulted in 47% and 130% elevations in dry weights respectively compared to the plants germinated on the corresponding composts alone. Pumpkin plants germinated on compost B and mixtures of BWS and compost B appeared to be healthier than those germinated on compost A and mixtures of BWS and compost A. Based on the outcome of the pumpkin study, chili germination trials were performed using compost B and selected mixtures of compost B and BWS (20%, 30% and 50% by volume). The overall observations were similar to what was observed in the pumpkin study. Optimal dry biomass accumulation was obtained for the treatment containing 30% BWS by volume (Fig. 3 and Table I). Addition of 30% BWS resulted in a 155% elevation in dry biomass in chili plants compared to the ones germinated on compost B alone.

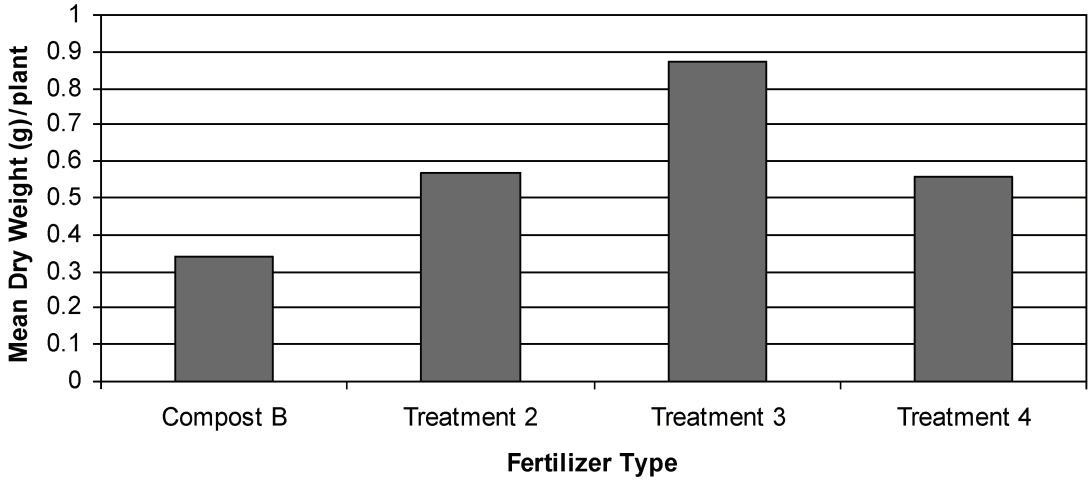


Fig. 3. Summary of results of chili seed germination trials using compost B and mixtures of compost B and 20%, 30% and 50% by volume BWS as treatment 2, 3 and 4 respectively.

The dry biomass of pumpkin plants germinated on compost B and a mixture of 50% BWS and 50% compost were analysed for selected nutrients. It can be seen that the percentage of nitrogen incorporated in the plant tissue was almost double in plants germinated on the mixture (Table IV), whereas organic carbon content was almost the same for both fertilizers. Even though the BWS contain low potassium, it is evident that comparatively more potassium uptake has occurred in the plants germinated on the mixture (Table II and IV). Availability of nitrogen from BWS may have enhanced the microbial activity of the compost, aiding more of its uptake.

Field trials were performed with chili to study the feasibility of direct application of BWS as fertilizer. The field growth trials with chili plants revealed that the plants cultivated on beds applied with BWS gave the highest mean dry weight per plant (Table V). Furthermore the addition of BWS (50% by volume) to both types of composts improved plant growth in terms dry weight (Table V). The above mean dry weight observations were similar to what was noted during germination trials with chili seeds (Fig. 2). The results for the mean height of the plants also demonstrated similar trends as for dry weight. Inclusion of BWS elevated the mean dry weight of chili plants by 74% and 16% for compost A and compost B respectively during the field trial.

The highest number of chilies produced per plant was also observed for plants cultivated with BWS alone (Table VI). Addition of BWS to compost A had a positive effect on both number of chilies per plant as well as mean dry weight per chili (Table VI). Addition of BWS to compost B did not demonstrate any significant improvements in these parameters. Previous work by Luque *at al.*[7] also demonstrated a significant correlation between the applied dose of BWS and yields in corn, sorghum and peanuts grown on test areas. Furthermore investigations by Craft and Nelson[2] revealed that compost made with BWS was suppressive against seedling and root diseases caused by the fungus *Pythium graminicola.* The analysis of selected content of nutrients in chili plants cultivated with BWS alone was almost the same as with the two types of composts studied or the mixtures containing BWS (Table VII). The overall findings demonstrated that BWS on its own can also be utilized as a fertilizer in addition to an admix for composts.

TABLE IV. Comparison of nutritional content of pumpkin plants.

Parameter	Compost B	Treatment 4-B (50% of compost B and 50% of BWS)
Organic carbon (%)	43.7	43.9
Total nitrogen (%)	1.8	3.3
Potassium as K_2O (%)	7.5	10.4
Magnesium as MgO (%)	1.6	0.5
Calcium as CaO (%)	1.1	0.2

CONCLUSIONS

The results presented in this work have shown that BWS can be a valuable source of nutrients for plants. Sun dried BWS can be applied directly to promote plant growth

TABLE V. Growth of chili plants during field trials.

Fertilizer type	Mean height of plant (cm)	Mean dry weight of plant (g)
BWS	29.33^{A}	7.89^{a}
Compost A	17.25^{B}	2.27^{c}
Compost B	25.40^{A}	4.93^{abc}
50% BWS and 50% compost A	26.60^{A}	4.08^{bc}
50% BWS and 50% compost B	32.10^{A}	5.72^{ab}

Means were compared using Duncan's multiple range test. Means with same letter are not significantly different.

TABLE VI. Yield of chilies during field trials.

Fertilizer type	Mean number of chilies per plant	Mean dry weight of chilies (g)
BWS	19.4^{A}	1.94^{ab}
Compost A	4.4^{B}	0.58^{c}
Compost B	13.3^{A}	2.40^{a}
50% BWS and 50% compost A	15.8^{A}	2.70^{a}
50% BWS and 50% compost B	10.6^{AB}	1.32^{bc}

Means were compared using Duncan's multiple range test. Means with same letter are not significantly different.

TABLE VII. Comparison of nutritional content of chili plants cultivated in field trials.

Parameter	BWS	Compost A	Compost B	50% BWS and 50% compost A	50%BWS and 50% compost B
Organic carbon (%)	44.2	45.8	45.0	49.1	44.2
Total nitrogen (%)	2.8	2.9	2.9	1.8	3.2
Total phosphorous as P_2O_5 (%)	0.3	0.4	0.5	0.4	0.4
Potassium as K_2O (%)	3.6	4.3	4.0	3.5	3.5
Magnesium as MgO (%)	0.2	0.2	0.2	0.1	0.1
Calcium as CaO (%)	2.3	1.8	1.8	2.0	1.9

or in combination with mature compost. Furthermore, the selected heavy metal content was far below the recommended levels in Sri Lanka. This work also revealed that co-composting with BWS is not required, saving time and energy. Sun drying the BWS for agricultural application is more economical than flocculating and centrifuging as outlined by Stocks and co workers.[9] Agriculture dependent developing countries such as Sri Lanka rely mainly on imported inorganic chemical fertilizers and thus byproducts such as BWS could play a role in the development of the economy in an environmentally friendly manner.

REFERENCES

1. Barker, A.J., Stocks, C. and Guy, S., Options for the disposal of brewery effluents. Proceedings of the 7th Brewing Convention, Inst. Brew. Africa Sect. Nairobi, Kenya, 1999, pp. 186–192.
2. Craft, C.M. and Nelson, E.B., Microbial properties of composts that suppress damping off and root rot of creeping bent grass caused by *Pythium graminicola. Appl. and Environ. Microbiol.,* 1996, **62**(**5**), 1550–1557.
3. Genner, C., Treatment and disposal of brewery effluents. *Brewers Guardian,* 1988, **Oct**., 25–27.
4. Johnson, D., Underworld connections. *Biologist,* 2005, **52**(**3**), 155–160.
5. Kanagachandran, K., Biogas generation from brewery wastes. Demonstration at a laboratory scale. *Tech. Q. Master Brew. Assoc. Am.,* 2004, **41**(**4**), 394–397.
6. Kanagachandran, K., Optimisation of spent grain slurry for energy generation. *Tech. Q. Master Brew. Assoc. Am.,* 2005, **42**(**4**), 324–328.
7. Luque, O., Bracho, O. and Maier, T.W., Utilization of brewery waste water sludge for soil improvement. *Tech. Q. Master Brew. Assoc. Am.,* 1990, **27**(**1**), 5–9.
8. Reed, R. and Henderson, G., Water and waste water management. Its increasing importance to brewery and maltings production costs. *Ferment,* 1999, **12**(**6**), 13–17.
9. Stocks, C., Barker, A. J. and Guy, S., The composting of brewery sludge. *J. Inst. Brew.,* 2002, **108**(**4**), 452–458.
10. Zero Emission Research and Initiatives (ZERI) (Last accessed May 2006) http://www.zeri.org/index.cfm?id=home

(Manuscript accepted for publication May 2006)

ATTACHMENT 18

The Composting of Brewery Sludge

C. Stocks,[1,2] A.J. Barker[1] and S. Guy[1]

ABSTRACT

J. Inst. Brew. 108(4), 452–458, 2002

Sludge produced from a trickling filter effluent treatment plant dedicated to the treatment of brewery wastewater was flocculated with cationic polyelectrolytes and dewatered by centrifugation to produce a cake of around 16% (w/w) solids. This cake was mixed with spent grains, shredded office paper and straw to produce an initial mix of 34% (w/w) dried solids with a carbon:nitrogen ratio of 21:1. Temperatures of over 45°C were achieved for around 9 days in a purpose built, laboratory scale, composting unit equipped with temperature and aeration control. Dried solids (DS) were increased to about 65% (w/w) and the volatile solid fraction was reduced from 80% to 60% (w/w) of DS by microbial degradation. The compost was rich in nitrate and phosphate and was used as a peat substitute in qualitative, comparative growth trials where geranium and tomato plants were successfully grown.

Key words: Brewery sludge, composting, peat substitute, spent grains.

INTRODUCTION

Throughout the 1990s the UK brewing industry was producing around 60 million hectolitres of beer per annum[1]. Breweries are among the largest industrial users of water in the UK. Reported ratios of volumes of water used[2], compared to the beer produced, varied from 3:1 to 10:1. Traditionally these large volumes of effluent were discharged to the municipal sewer. This practice incurs high charges from local water authorities for treatment at their sewage works. Rationalisation of the brewing industry has led to fewer, but much larger, production plants. As a consequence, the volume of effluent produced may justify investment in the construction of dedicated effluent treatment plants.

A report by the Department for Environment, Food & Rural Affairs (DEFRA)[3] estimates current UK sewage sludge production at around 1.1 million tonnes dried solids (DS) per year. However, sewage sludge production is expected to rise to around 1.6 M t DS per year by 2005[3,4] as a greater proportion of sewage is treated and higher treatment standards are applied as a result of the Urban Wastewater Treatment Directive (1991). This directive banned the dumping of sludge at sea by the end of 1998 which previously had been the disposal route for around 30% of the UK's total sludge production. As a result of the wastewater directive's requirement that sludge should be reused whenever possible, and because efforts should be made to reduce its environmental impact, the main UK disposal route for sludge has been pretreatment followed by controlled application to agricultural land. However, the resulting increase in sludge disposal to land, and the lack of standards for pre-treatment, has lead to concerns over the accumulation of heavy metals, bacteriological contamination and the polluting effects of run-off to local drainage systems. It is within this context of current environmental control legislation and sludge disposal practice that the work reported in this paper should be placed.

This paper relates to sludge derived from an aerobic trickling-filter effluent treatment plant dedicated to the treatment of brewery wastewater. The major disadvantage of aerobic systems is the production of relatively large volumes of sludge requiring further treatment and disposal. From the dedicated effluent treatment plant referred to in this study, around 40–50 m^3 of the brewery sludge, the properties of which are shown in Table I, had traditionally been removed by tanker each weekday for application to local agricultural land. However, tightening restrictions and concerns over excessive application to land have resulted in increased costs to transport the sludge further and the need to employ the more expensive technique of direct land injection of sludge. In order to alleviate the pressure applied by EU and UK environmental legislation, other methods of sludge treatment/disposal were considered. These options have been reviewed by Barker *et al.*[5] This paper investigates the practical utilisation of sludge and other wastes arising from the brewing industry and is a continuation of a brewery sludge characterisation and dewatering study published previously by the authors[6].

MATERIALS AND METHODS

Composting

Sludge composting as a route for disposal is not wide spread in the UK. Only 0.5% of sludge is composted[4] which equates to the production of approximately 7000 t of compost each year. In Europe, by contrast, 200 000 t of composted material is produced annually. Composting has also become popular in the US as a result of tighter restrictions and lack of landfill space close to urban areas. For example, in Philadelphia, large scale composting operations now produce around 600 000 t of composted material every year[7].

The composting process was selected for study as it achieves substrate stabilisation by degradation of offensive volatile organic substances, pathogen destruction and

[1] Chemical engineering, University of Birmingham, Edgbaston, Birmingham, B15 2TT, UK.
[2] Corresponding author. Email: c.p.stocks@bham.ac.uk

Publication no. G-2002-1309-001

moisture reduction. It also offers the possibility of treating other organic waste materials in the same process. Composting provides a sludge recycling route that allows plant nutrients and organic matter to be reused, whilst furnishing the opportunity for comprehensive sludge stabilisation prior to use. The composting process is exothermic and therefore requires low energy input. Using an enclosed and controlled unit, degradation rates can be increased and odour emissions contained and treated. High temperatures achieved during composting also offer sludge pasteurisation and weed seed inactivation, important factors when considering handling and use of compost for plant growth.

The compost derived from brewery sludge offers advantages over that from municipal sludges. The treatment plant that provided the source material for this study is dedicated solely to brewery wastewater treatment so the sludge produced contained only trace quantities of toxic heavy metals and virtually none of the pathogenic organisms normally associated with domestic sewage[8].

Composting parameters

To achieve rapid aerobic thermophilic composting, there are several parameters that must be satisfied to promote optimal composting conditions. Addition of suitable bulking agents to the sludge is required for improved nutrient balance, moisture content, structure and aeration. Successful composting systems follow a typical temperature profile through the four stages shown in Fig. 1. Throughout these stages, temperature and substrate availability control the microbial population and rate of decomposition. The important composting parameters are:

(i) Initial C/N ratio[9,10] of between 25:1 and 35:1.
(ii) Initial moisture content[9–11] of between 50 and 70% (w/w).
(iii) Oxygen level[11,12] should always be above 5% (v/v).
(iv) Free air space (FAS)[11] within the composting material of around 30–40% (v/v).
(v) Initial pH[9,10] of 6–9 preferable.
(vi) Temperature – a maximum sludge degradation rate[11] is usually observed around 55°C.

Experimental

The brewery sludge was first dewatered to give a sludge cake of around 16% (w/w) solids to allow composting. This was achieved by cationic polyelectrolyte flocculation with around 10 kg t^{-1} DS Zetag-87 (Allied Colloids, Bradford, UK) and the solids separated with an Alfa Laval pilot plant centrifuge[6].

TABLE I. Brewery sludge properties.

Parameter	Mean Value	Std. Dev.
Total Solids (% w/w)	2.16	0.23
Suspended Solids (mgL^{-1})	18 000	6 650
Dissolved Solids (mgL^{-1})	1 350	739
Fixed Solids (%DS)	31	3.5
Volatile Solids (%DS)	69	3.5
pH	7.28	0.38
NH_3 (mgL^{-1})	770	—
COD (mgL^{-1})	21 800	5 500
BOD (mgL^{-1})	9 600	2 600
Zeta-Potential (mV)	–39.3	2

Composting unit

To assess the composting characteristics of brewery wastes, a laboratory composting unit was designed and constructed. This unit, shown in Fig. 2, was equipped with a temperature control system designed to reduce the temperature gradient across the compost pile by preventing conductive heat loss, a major limitation of small scale composting. Heat was supplied by 15 m of 15 Wm^{-1} heating cable wrapped around the bin, the bin being lined with aluminium foil to distribute the heat. The system was controlled by a Eurotherm 2208 temperature control unit (Eurotherm Ltd, Worthing, UK). Thermocouples 1 and 2 were wired 'back to back', thus cancelling each other and giving a 0°C output, when both were at the same temperature.

In this manner the system was designed to follow the increasing temperature caused by the exothermic microbial action but not to heat the compost above its equilibrium temperature. The unit therefore imitated the centre of a much larger compost pile. Hence, as composting proceeded the temperature at the centre of the pile rose more rapidly than the outside as a result of conductive heat loss to the surrounding environment. The temperature control unit operated within a band width of 2°C, meaning that when thermocouple 1 was 2°C above thermocouple 2, the heating coil was turned on. The heating coil was turned off when the temperature difference was less than 2° C.

An asymmetric timer gave periodic aeration so ensuring aerobic conditions and removal of water. A second air supply kept the temperature of the pile below 65°C thereby preventing severe microbial inhibition at high temperatures.

Compost monitoring

Temperatures within the compost pile were measured every hour by thermistors placed at positions A–D, as shown in Fig. 2, and were recorded using a 1200 series squirrel data logger.

Total and volatile solids were obtained from the analysis of 3 grab samples of composting material taken after mixing. Total solids are the mass percentage remaining after drying to a constant weight at 105°C. Volatile solids

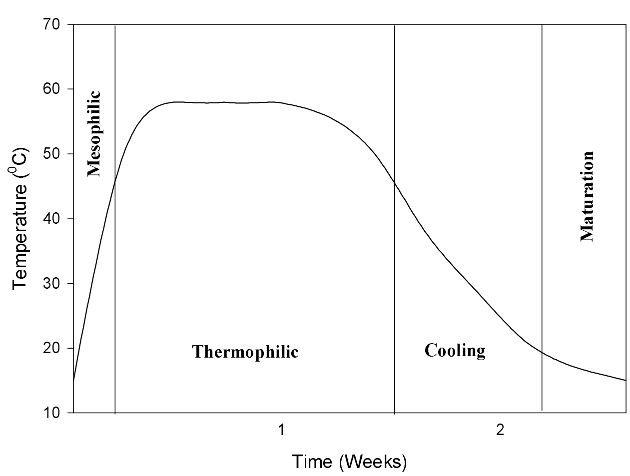


Fig. 1. Typical temperature profile for different stages of controlled composting.

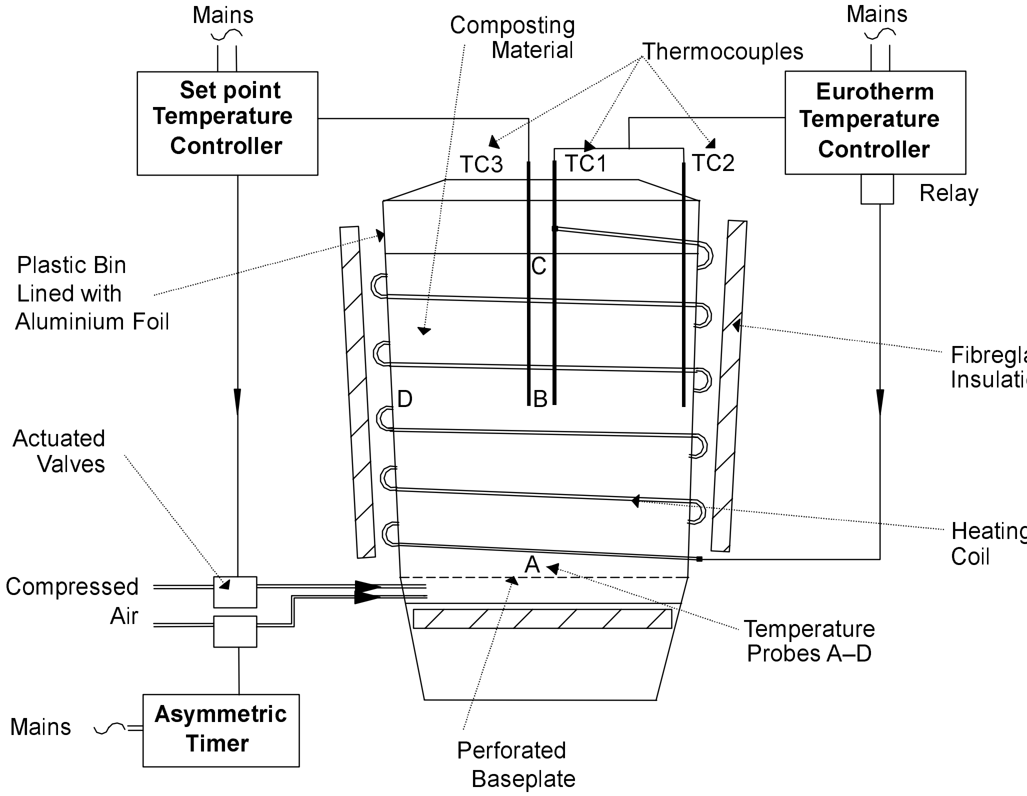


Fig. 2. Schematic of composting unit.

are the mass lost on ignition of the dried solids at 550°C and gives an indication of the fraction of solids that are organic in nature.

Compost analysis

Water retention, air filled porosity (AFP) and bulk density were recorded as detailed in the British Standards for peat[13]. Plant nutrient concentrations, ammonia and pH were measured on water extracts taken using the standard 1 volume of media extracted with 6 volumes of distilled water[14]. Nitrate and phosphate concentrations were determined photometrically using standard HACH® (Camlab Ltd., Cambridge, UK) reagents. Ammonia concentrations were determined with a standardised ammonia selective electrode (Camlab Ltd., Cambridge, UK).

Plant growth trials

A programme of comparative plant growth trials using 4 different growing media was conducted to evaluate the quality of the brewery compost. The brewery compost was used as a peat replacement.

John Innes (formulated on site) No. 1 potting media (JI) is a general purpose growing media consisting of 7 parts loam: 3 parts peat: 2 parts grit with added chemical fertilisers, the whole being steam sterilised. John Innes No. 1 media was used as the control media.

For these trials, a potting media was mixed to the John Innes formula with brewery compost (BC) replacing the peat and omitting the chemical fertilisers. A media containing brewery compost was also steam sterilised (BCS) at 121°C, 2 bar for 15 minutes in order to assess any detrimental microbial effects. As a further comparison with commercially available peat products, a growth trial was also conducted using ‘Petersfield’, (Petersfield Products, Leicester, UK) a general purpose, peat based (PB) growing media formulated with added chemical fertilisers and water retention aids.

Germination and growth trials were conducted with geranium and tomato as each make different demands on the growing media.[15,16] Geranium represent the average bedding and pot plant and should reveal any nutrient deficiencies. Tomatoes are vigorous growers and require a lot of nitrogen. Twenty seeds of each plant were sown in each growing media and allowed to germinate. Five plants were then selected as an average representation for potting on to maturity both with and without a regular supply of plant food. The remaining young plants were used to determine dry biomass values.

RESULTS

Composting trials

The composting trials reported here were disrupted by unexpected intermittent failures of the aeration control system. Nevertheless, with appropriate manual intervention, the detrimental effects of these failures were ameliorated with the result that good quality compost was still produced.

A fresh compost mix of the composition shown in Table II was loaded into the composting unit. The temperature profile recorded during composting is shown in Fig. 3. The rapid rise in temperature during the first day of com-

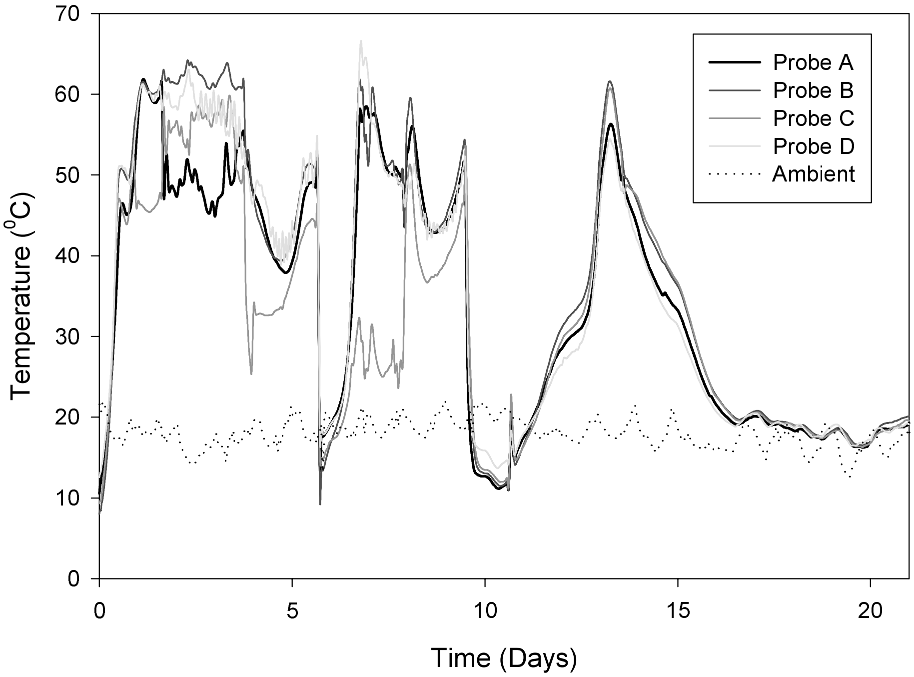


Fig. 3. Temperature profile of compost pile.

posting showed that the brewery wastes provide readily available nutrients to produce a very active composting pile. Thermophilic temperatures were achieved quickly and the temperature feedback mechanism was activated to keep the material below 65°C. The close correlation between the temperatures recorded by probes B and D showed that the temperature control system successfully reduced temperature gradients across the width of the bin. Thermophilic temperatures were maintained until day 6 when a dramatic drop in temperature to below ambient was observed. This temperature drop was a result of aerator failure in operating mode which consequently caused excessive amounts of water to be removed, thus cooling the pile. Aerator failure occurred again on day 9. However, on re-wetting the pile, on each occasion, the temperature rose rapidly to give thermophilic temperatures indicative of rapid microbial oxidation of biodegradable substrates. This drying and re-wetting, although extending the composting period, had no overall detrimental effect on the process. The material was composted to stability, showing no evidence of self-heating. Overall, the compost achieved thermophilic temperatures for 9 days. After day 17 the pile remained at ambient temperature and did not reactivate on the addition of water demonstrating that stabilisation had been achieved.

Table II. Composition of initial compost mix.

	Mass (kg)	Solids (% w/w)	C (% w/w DS)	N (% w/w DS)	Total C (g)	Total N (g)	C/N ratio
Sludge	7	16	36	7	403	78	5
S. Grains	4	24	53	2	509	20	25
Straw	1.5	95	43	0.2	608	3	225
Paper	1.5	85	35	0.5	701	6	110
TOTAL	**14**	**34**	**—**	**—**	**2222**	**108**	**21**

The total solids content of the compost, as plotted in Fig. 4, shows the periods of excessive drying and re-wetting of the material. Overall, the solids fraction was increased from around 40% to 65% (w/w), thus giving a product with reduced mass and volume that could be handled, stored and transported easily. Fig. 4 also shows that the volatile solids fraction was reduced from 80% to 60% (w/w) of DS, arising from microbial oxidation of the readily degradable substrates responsible for the offensive nature of the brewery sludge. Following this period of active composting, the material was allowed to mature for 3 weeks in order to achieve further degradation of the straw.

Plant growth trials

The matured brewery compost was analysed for both physical and chemical properties in order to assess its quality and hence potential market. The properties of the brew-

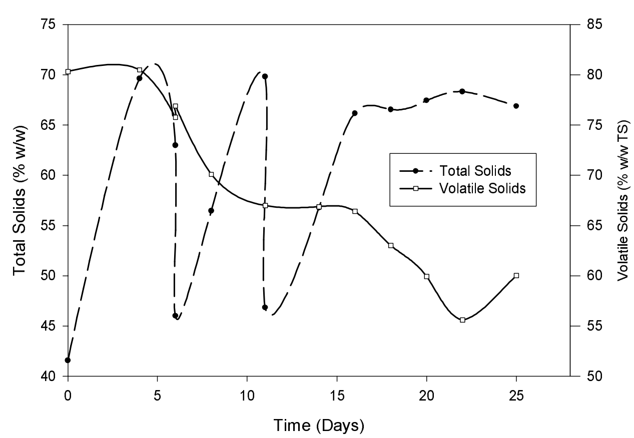


Fig. 4. Change in total and volatile solids during composting.

LPRSA0156623

Table III. Properties of brewery compost and growing media.

Parameter	Compost	JI[a]		PB[b]		BC[c]		BCS[d]	
		1	2	1	2	1	2	1	2
Bulk Density (g L^{-1})	162	930	898	460	342	1025	1032	1065	1014
AFP[e] (% Vol.)	35	2	1	7	3	12	11	11	10
Water Ret. (% w/w)	77	37	41	83	84	29	31	30	31
pH	7.2	6.8	7.1	4.9	4.6	7.6	7.5	7.6	7.3
NH_3 N (mg L^{-1})	287	21	26	2	<1	65	64	127	84
NO_3^- N (mg L^{-1})	109	94	35	58	122	45	54	25	34
PO_4^{3-} P (mg L^{-1})	124	4	4	42	62	10	9	7	3

[a]John Innes No. 1 Media, [b]Petersfield Peat Based Media, [c]Brewery Compost Based Media, [d]Sterilised Brewery Compost Based Media, [e]Air Filled Porosity

ery compost and the growing media used in the trials are shown in Table III. Two values are given for each parameter in order in give an indication of the variation between batches of media. Batch 1 was the material in which the seeds were sown and Batch 2 was the media into which the young plants were potted. Both brewery composts had higher AFP values and retained less water than both the control and comparative media. This resulted from the open structure of the brewery composts due to the presence of straw. However, all media showed AFP values suitable for plant growth[14]. The brewery composts had a slightly alkaline pH as a result of the high ammonia content of the brewery sludge. Although a slightly acid media pH is preferred the difference should not have caused significant detrimental effects on plant growth. The nitrate and phosphate concentrations measured in the brewery composts were found to be suitable for plant growth without the need for added chemical fertilisers. The nitrate concentrations compared well with the control media. Phosphate concentrations in the brewery media were much lower than those measured in the peat-based media, but higher than that of the direct peat replacement, the JI control. As a result of steam sterilisation the nitrate and phosphate concentrations in the brewery compost were reduced and the ammonia concentration was increased. This may have been a result of reduction reactions occurring at elevated temperature and pressure.

The number and rate of successful geranium germinations in the BC brewery compost were similar to those achieved in the control media. The brewery compost out

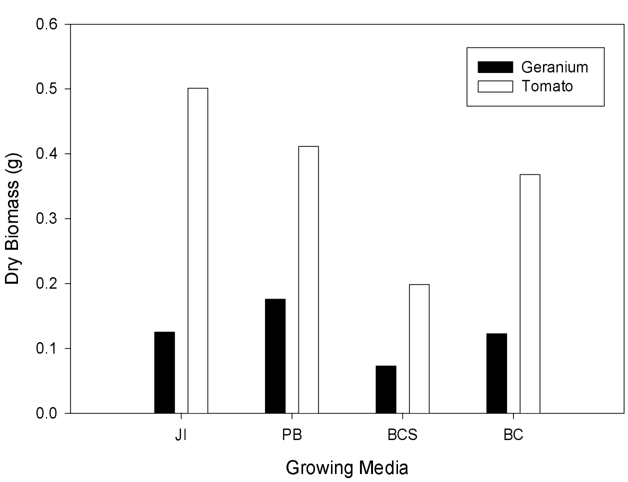


Fig. 5. The dry biomass of young plants.

performed both JI and PB media for the germination of tomatoes. However, the sterilised brewery compost BCS produced poorer germination performance. The average biomass accumulated by a sample of young plants grown in the different media is shown in Fig. 5. Five weeks after sowing geranium and tomatoes plants, those grown in JI and PB media were bigger than those grown in either brewery compost media. This was assumed to be a result of the brewery media having a more open structure and poorer water retention properties than the JI and PB media which thereby made it less suitable for sustaining the growth of very young plants.

The higher ammonia concentrations found in the brewery compost may also affect the growth of seedlings. The lower growth rate seen in the brewery media was more pronounced in BCS, with lower plant nutrient concentrations and an increased level of ammonia.

Further growth of 5 established plants showed great promise for the potential value of brewery compost. Figs. 6 and 7 show that after 21 weeks of growth, without the addition of plant food, both species of plant achieved more successful growth in the brewery compost media than in the control media. The geraniums grown in JI were sparsely foliated and showed stunted growth. The geraniums grown in PB, although of a similar size to the brewery compost geraniums, showed less vigour and had begun to shed leaves. Tomatoes grown in brewery compost were more healthy than those grown in control media, especially BC. This improved growth was assumed to be a result of the degradation of organic matter present in the brewery compost, producing a slow release of plant nutrients. This is not possible when peat is used as degradation was achieved during peat formation. Once the initial chemical fertilisers in the control media were consumed, or leached out, they were not replaced and therefore plant growth was restricted.

With the regular addition of nutrients there was a striking improvement in the geranium and tomato plants grown in the peat-based media. This illustrates the lack of nutrient found naturally in peat and the fact that the physical properties of peat are very favourable for plant growth if nutrients are supplied. There was little difference in the height of the tomatoes grown in the brewery compost media when the plants were fed, but the plants had more vigour and a higher yield of fruit than those not fed. The geranium and tomato plants grown in JI were significantly smaller than those grown in the other media, but there was a noticeable improvement in the fed plant when compared to the corresponding un-fed tomato plant. Figs. 6–9 show

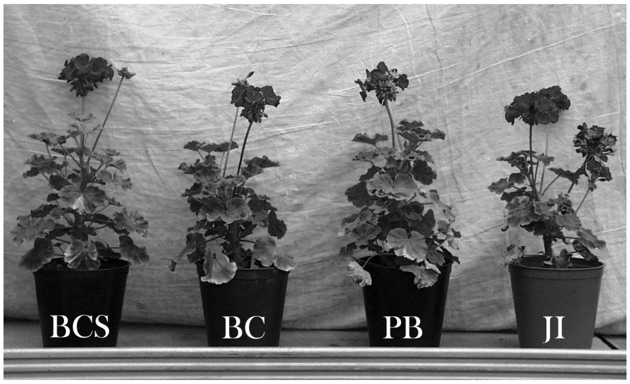


Fig. 6. Geranium growth after 21 weeks without feed.

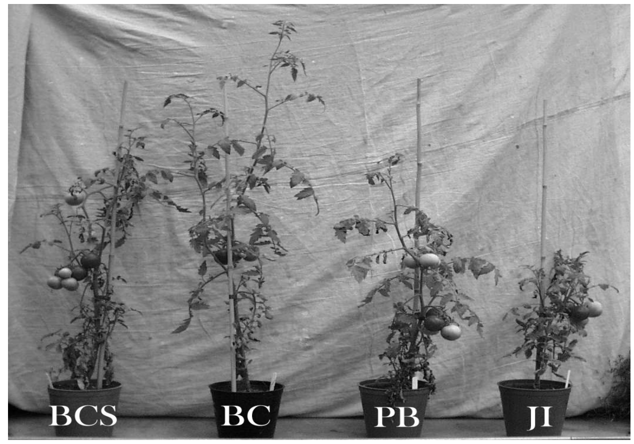


Fig. 7. Tomato growth after 21 weeks without feed.

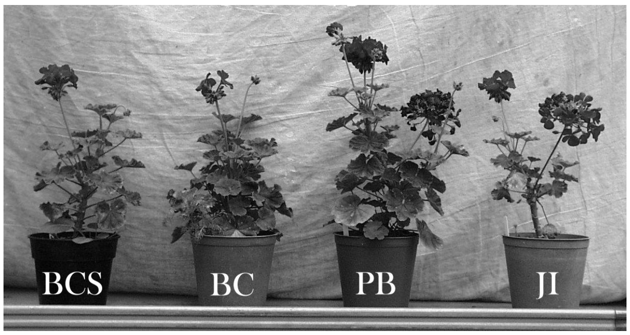


Fig. 8. Geranium growth after 21 weeks with feed.

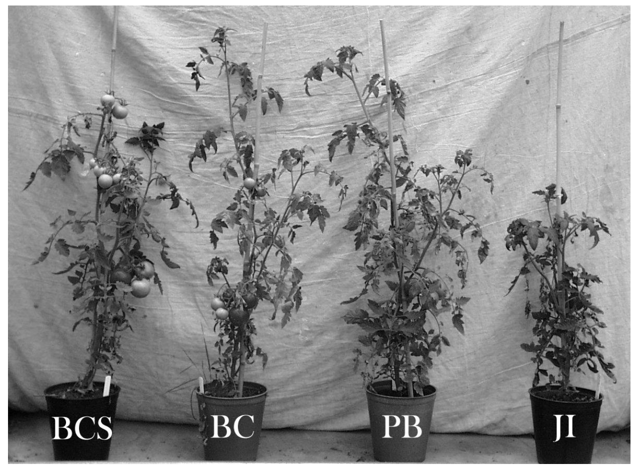


Fig. 9. Tomato growth after 21 weeks with feed.

that when the brewery compost was used as a peat replacement in the John Innes formulation, larger and healthier geranium and tomato plants could be grown with or without the use of added plant nutrients.

DISCUSSION

The work presented in this paper has demonstrated that it is possible to produce good quality compost capable of supporting plant growth when using brewery sludge cake as an initial compost constituent. The required nutrient balancing and bulking also provided the opportunity to recycle other organic brewery wastes such as spent grains and paper. High levels of plant nutrients and the availability of 'slow-release' nutrients on degradation of organic material in the brewery compost allowed good growth of mature, well-established plants to be achieved. Unfortunately, poor physical properties of the compost, that is, low water retention and high AFP, lead to reduced performance in the growth of young plants. However, improvements in the physical properties of this compost may be achieved by shredding or using other bulking agents and carbon sources, such as sawdust, green waste or possibly shredded packaging material from the brewery itself. This could improve both AFP and water retention of the final product, producing a growing media more suitable for young plants and thus increasing the value and expanding the market open to brewery compost as a 'general' or 'multipurpose' growing media.

Work previously reported by the authors has shown that the concentration of brewery sludge solids to a level suitable for composting is feasible on an industrial scale when dosing with cationic polyelectrolytes and dewatering with a decanter centrifuge.[6] The potential market for the final compost product has encouraged the investigation into large-scale composting regimes dedicated to the treatment of organic wastes generated in the brewing industry.[8] However, with increasing interest and government backing for the composting of other waste streams, such as Municipal Solid Waste (MSW), there may be a potential use for nutrient rich brewery sludge cake as an adjunct in these systems.

CONCLUSIONS

The composting of brewery wastes, along with other organic wastes including straw and paper, allows rapid stabilisation of putrescible material under controlled conditions. The final brewery compost product is rich in the nutrients and organic matter essential for plant growth, chemically and biologically stable and easily handled and stored. Composting, therefore, offers a relatively cheap and environmentally sound method of recycling organic brewery by-products. This saleable product could make a valuable soil supplement in horticultural markets potentially turning a costly sludge disposal problem into a profit making compost manufacturing process.

ACKNOWLEDGEMENTS

The authors would like to thank the committee of the Adrian Brown Scholarship fund and The Whitbread Beer Company for financial support. Our thanks are also extended to Alfa Laval for technical assistance in sludge dewatering trials and to John Martin in plant growth trials.

REFERENCES

1. Thurman, C.W. and Witheridge, J.R. Statistical Handbook. The Brewers and Licensed Retailers Association, 1997.
2. Genner, C. Treatment and disposal of brewery effluents. *Brewers Guardian,* Oct., 1988, 25–27.
3. Department for Environment, Food & Rural Affairs (DEFRA). Waste Strategy 2000 for England and Wales. http://www.defra.gov.uk/environment/waste/strategy/index.htm 2000.
4. Davis, R.D., The impact of EU and UK environmental pressure on the future of sludge treatment and disposal. *Journal of the Chartered Institution of Water & Environmental Management,* 1996, **10**, 65–69.
5. Barker, A.J., Stocks, C. and Guy, S., Options for the disposal of brewery effluents. Proc. 7th Brewing Convention, Inst. Brew. Africa Sect. Nairobi, Kenya, 1999, pp. 186–192.
6. Stocks, C.P., Barker, A.J. and Guy, S., Dewatering of brewery sludge produced from a dedicated aerobic effluent treatment plant. *Journal of the Institute of Brewing,* 1999, **105**, 279–285.
7. Hudson, J.A., Current technologies for sludge treatment and disposal. *Journal of the Chartered Institution of Water & Environmental Management,* 1996, **10**, 436–441.
8. Stocks, C.P., The processing of brewery sludge to produce a useful compost. PhD Thesis, University of Birmingham, 2001.
9. Gray, K.R., Sherman, K. and Biddlestone, A.J., A review of composting – Part 1. *Process Biochemistry,* June, 1971.
10. Gray, K.R., Sherman, K. and Biddlestone A.J., A review of composting – Part 2, The practical process, *Process Biochemistry,* Oct., 1971.
11. Haug, R.T., The practical handbook of compost engineering. Lewis Publishers: Boca Raton, 1993.
12. Schulze, K.L., Continuous thermophilic composting. *Journal of Applied Microbiology,* 1962, **10** (2), 108–121.
13. British Standard 4156:1990, Recommendations for peat for horticultural and landscape use, 1990.
14. Bunt, A.C., Media and Mixes for Container-Grown Plants. Unwin Hyman: Great Britain, 1988.
15. Which? Gardening. Sowing and Potting Composts, 1992, Jan/Feb., 12–14.
16. Which? Gardening. Sowing and Potting Composts, 1993 Jan/Feb., 19–21

(Manuscript accepted December, 2002)

ATTACHMENT 19

Removal of Chromate from Cooling Tower Blowdown by Reaction with Electrochemically Generated Ferrous Hydroxide

E. I. Onstott[1] **and William S. Gregory**

University of California, Los Alamos Scientific Laboratory, Los Alamos, N.M. 87544

Edward F. Thode

New Mexico State University, Las Cruces, N.M. 88001

■ Treatment of cooling tower blowdown with electrochemically generated $Fe(OH)_2$ quantitatively reduced Cr(VI) to Cr(III) and concurrently precipitated it without pH adjustment. Concentrations of Cr(VI) of <0.005 mg/l. were achieved. $Fe(OH)_2$ treatment also precipitated a large fraction of the phosphate and other anions to improve product effluent quality significantly with respect to total dissolved solids. Steady-state generation of $Fe(OH)_2$ in blowdown was accomplished with high Faraday efficiency in a flow cell which utilized sacrificial low-carbon steel anodes and stainless steel cathodes. Colloids were formed under most electrolysis conditions, and special procedures were required to obtain filterable precipitates.

Chromate salts are used commercially for corrosion control in cooling water systems. Wastes from chrome plating baths contain both chromate salts and chromic acid. Removal of chromium from these waste effluents prior to return to natural waterways is a major environmental problem. Hexavalent chromium is especially undesirable since it is known to be carcinogenic (Amer. Pub. Health Assoc., 1965) and also deleterious to sewage plant operation (Siegerman, 1971).

Levels of chromium allowed in waste effluents which are returned to natural waterways and underground reservoirs by Federal law are presently controlled by state environmental improvement and protection agencies. The U.S. Public Health Service has specified a maximum Cr(VI) concentration of 0.05 mg/l. for drinking water.

Treatment for Cr(VI) removal usually involves chemical reduction to Cr(III) with SO_2, sulfite salts, $FeSO_4$ (Carls and Schieber, 1971), or $Na_2S_2O_5$ (Balden, 1959) all at pH 2.5 to 3. Cr(III) is then precipitated at pH 8.5 by adding NaOH or CaO. These procedures increase total dissolved solids (Na_2SO_4 or $CaSO_4$) in the treatment process by an estimated 200 mg/l. for a Cr(VI) content of 15 mg/l.

Several other methods of treatment which have been reported include reduction by scrap iron (*Air, Water News*, 1971), iron chips (Selm and Hulse, 1962), iron powder (Hine, 1969), metal sulfides (Lancy, 1966), electrochemical reduction with carbon particles (*Products Finishing*, 1970), and ion exchange (Carls and Schieber, 1971).

A new method of treating cooling tower blowdown utilizing electrochemically generated $Fe(OH)_2$ as the reducing agent is reported here. Cr(VI) is reduced quantitatively to Cr(III) by $Fe(OH)_2$ and concurrently precipitated without adjusting the pH of the blowdown before or after electrolysis. The reaction can be written:

$$0.5Cr_2O_7^{2-} + 3Fe(OH)_2 + 3.5H_2O \rightleftharpoons Cr(OH)_3 + 3Fe(OH)_3 + OH^- \quad (1)$$

The free energy change, $\Delta G°$, for this reaction in neutral solution was computed from Latimer's data (1952) to be −38.3 kcal/mol of Cr, and it is almost as large as for the reaction in acid solution:

$$HCrO_4^- + 7H^+ + 3Fe^{2+} \rightleftharpoons Cr^{3+} + 3Fe^{3+} + 4H_2O \quad (2)$$

where $\Delta G°$ is −40.1 kcal/mole of Cr.

In this paper are reported the results of laboratory batch and flow cell experiments which were done to test improvement of water quality with respect to Cr(VI), Cr(III), soluble orthophosphate, soluble condensed phosphates, and total dissolved solids.

Experimental

The source of waste water was cooling tower blowdown effluent from the Los Alamos Scientific Laboratory power plant. The cooling water is routinely made up from secondary sewage effluent from the Laboratory Technical Area treatment plant, and a proprietary corrosion inhibitor (Betz Laboratories, Trevose, Pa.) containing chromate, phosphate, and zinc is added. Typically, the quality of the secondary sewage effluent is very good: chemical oxygen demand, 25 mg/l.; total dissolved solids, 210 mg/l.; total soluble phosphate (soluble orthophosphate plus soluble condensed phosphates which hydrolyze to orthophosphate), 2 mg/l. P. The cooling water is recirculated as many as four times and total dissolved solids in the blowdown increases by a factor of three or four.

Cr(VI), total Cr, soluble orthophosphate, and soluble condensed phosphate analyses were done, usually in triplicate, according to Standard Methods (Amer. Pub. Health Assoc., 1965). The permanganate method was used for total Cr, and the stannous chloride modification was used for phosphates.

Total dissolved solids were analyzed at 103°C by a procedure developed in this laboratory to obviate the need for desiccation of samples. Analyses were done in an air conditioned laboratory at 22.5 ± 1°C and about 50% relative humidity. Clean 250-ml beakers were dried for several hours at 103°C, cooled in air for 20 min, then tared to the nearest 0.1 mg. A top-loading Mettler balance was used to weigh 200 ± 0.05 grams of liquid sample which had been passed through a 0.45-μ membrane (Millipore) filter. After evaporation of samples to dryness on a steam plate, they were heated for at least 24 hr at 103°C, then weighed to the nearest 0.1 mg after cooling in air for 20 min. By this procedure, moisture absorption by samples after heating at 103°C was minimal, and not significantly different than if samples were desiccated prior to weighing. Triplicate samples were reproducible to a precision generally better than 3%. Beakers were conveniently cleaned for reuse with 1*M* oxalic acid and a brush to remove adherent solids.

Batch electrolyses were done with 1.8 l. of waste water in a 2-l. beaker. The cathode was a 316 stainless steel sheet 9.4 × 17 × 0.08 cm, positioned parallel to a mild cold-rolled steel (AISI C1010) anode of similar dimensions and separated at top and bottom with nonconducting spacers

[1] To whom correspondence should be addressed.

approximately 2 mm thick. Effective area of each electrode was 140 cm^2. The electrolyte was stirred with a 3.5-cm Teflon-covered magnetic bar at about 2000 rpm, such that a vortex funnel extended about two thirds of the way down from the surface, and the electrolyte was continuously swirled between the electrodes, which were located close to the wall of the beaker. Before each electrolysis, the anode was cleaned with 1*M* oxalic acid, washed with distilled water, and then air dried for about 15 min prior to weighing and immediate use. Experiments were done at constant current, manually controlled, usually at 1 A. The voltage required for 1 A was in the range of 3-6. At the start of each experiment, a reverse polarity electrolysis was done for 15-30 sec. After electrolysis, the anode was quickly wiped and washed clean of adhering material with distilled water, then air dried for a few minutes before weighing.

Most of the precipitate was removed by rough filtering with a compressed plug of fiber glass wool in a polyethylene funnel. Suspended solids and colloid not removed by this procedure were removed with a 0.45-μ membrane (Millipore) filter prior to analyses for chromium, phosphate, and total dissolved solids.

Steady-state flow experiments were done by pumping the blowdown from a barrel through a calibrated flowmeter to the electrolysis cell described below, using a small centrifugal pump. Flow rates were controlled with a 5-mm bore glass stopcock.

The cell was fabricated with two removable 12.7 × 52.3 × 0.64-cm type AISI C1019 cold formed steel anodes placed between three 12.7 × 52.3 × 0.08-cm Type 316 stainless steel cathodes in an upright position and spaced 0.16 cm. Acrylic plastic was used to frame the electrodes in a rectangular box. Feed to the cell was from the bottom; the product effluent overflowed the electrodes at the top of the cell. Total effective area of the anodes was 2080 cm^2, since both sides of each were utilized. Both sides of the middle cathode and one side of each outer cathode were utilized. Anodes were cleaned with 1*M* oxalic acid shortly before use, and were also operated cathodically for about 30 sec immediately prior to making a run.

Results and Discussion

Results from batch (beaker) experiments did not appear to be significantly different from results from steady-state flow cell experiments. Consequently, the results are reported in terms of appropriate parameters rather than by type of experiments.

Anodization of Fe. $Fe(OH)_2$ is generated electrochemically according to the electrode reactions:

$$Fe \rightarrow Fe^{2+} + 2e^- \text{ anode} \tag{3}$$

$$2H_2O + 2e^- \rightarrow H_2 + 2OH^- \text{ cathode} \tag{4}$$

$$Fe + 2H_2O \rightarrow Fe(OH)_2 + H_2 \tag{5}$$

Faraday efficiencies for this process in the blowdown effluents were evidently close to 100% as shown by weight loss measurements in Figure 1 for batch experiments. Good weight-loss data for the flow cell were not obtained because of the inability of weighing the anodes precisely after each individual run. However, the accumulated weight loss for several runs was very close to that expected for 100% Faraday efficiency.

Other investigators have reported on the efficiency of Fe anodization in waste waters. Miller and Knipe (1965) reported that steel anodes were anodized with 91% efficiency in sewage effluents, and Sadek (1970) measured about 100% efficiency for synthetic sewage. Recent work in this laboratory showed near 100% efficiency for low carbon steel anodes in secondary sewage effluents in beaker experiments, but in flow cell experiments only 84% efficiency was measured.

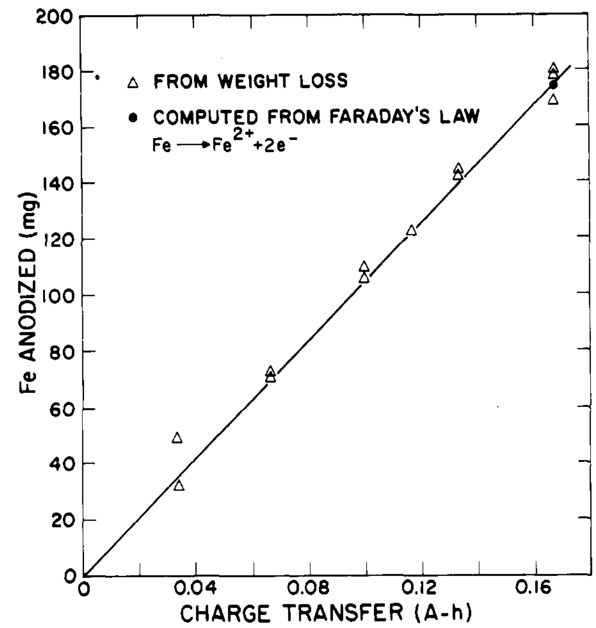


Figure 1. Faraday efficiency plot for $Fe(OH)_2$ generation in blowdown in batch experiments

Equation 3 is symbolic of the anode reaction, but probably it is not accurate for depicting the actual mechanism. Recent work by Bockris and co-workers (1971) on anodization of high purity Fe in neutral borate solutions showed that $Fe(OH)_2$ is formed as a layer on the anode. Similar behavior would be expected with blowdown, and under steady-state conditions the $Fe(OH)_2$ formed should be continuously ejected from the anode and react with Cr(VI) in solution.

Formation of Colloid. Colloids were formed in most of the electrolysis experiments. As a general rule, flocculated precipitates were obtained only when the amount of Fe anodized was <25 mg/l. or >200 mg/l. This behavior is in conformance with known coagulation phenomena (Stumm and O'Melia, 1968). For the former case, the precipitate was a mixture of Cr(III) and Fe(III) hydroxides and phosphates. For the latter case, the precipitate contained a large fraction of $Fe(OH)_2$ in addition to Cr(III) and Fe(III) hydroxides and phosphates.

As a practical matter, procedures were developed for obtaining filterable flocs while achieving quantitative Cr(VI) removal to concentrations of <0.005 mg/l. This could be done by three different procedures:

1. Electrolyze blowdown to give a concentration of Fe >200 mg/l.
2. Electrolyze blowdown to give a concentration of Fe >200 mg/l., then mix with unreacted blowdown to give the final product.
3. Electrolyze blowdown to give a concentration of Fe >200 mg/l.; electrolyze a second batch to give a concentration of Fe of 20-25 mg/l.; mix the two batches to give the final product.

Procedure 2 or 3 would ordinarily be preferred to minimize both iron consumption and electricity consumption, since 85 mg/l. of Fe would suffice. However, as will be seen later, for this stage of development, neither procedure 2 or 3 was effective for reducing total Cr to a very low level of <0.01 mg/l.

Removal of CR(VI) by $Fe(OH)_2$. Electrolytic reduction of Cr(VI) in blowdown on a stainless steel cathode could possibly occur (Uhlig, 1962), but evidently the rate is very low, since exploratory electrolyses with a stainless steel anode (which was passive) and stainless steel cathode showed essentially no reduction of Cr(VI).

Removal of Cr(VI) by batch electrolysis with a Fe anode is demonstrated in Figure 2. Reduction to Cr(III) was very efficient until the concentration of Cr(VI) became small. The amount of Fe(II) required for quantitative removal of Cr(VI) was about 65 mg/l. as shown in Table I. (Note that total Cr removal is covered in a later section of this discussion.)

Partial reduction of Cr(VI) in the flow cell was also very efficient as shown by Table II.

However, when a mixing procedure was used to obtain a filterable floc, the amount of Fe(II) required for complete Cr(VI) reduction was greater than with a batch electrolysis. Table III shows this effect. About 85 mg/l. of Fe(II) was required.

These results indicate that flocculated $Fe(OH)_2$ is not as effective as freshly generated $Fe(OH)_2$ for removal of last traces of Cr(VI) to a concentration of <0.005 mg/l.

Some experiments also were done by a mixing procedure where untreated blowdown was mixed with electrolyzed blowdown containing flocculated $Fe(OH)_2$. The amount of Fe generated was >200 mg/l., and the amount of Fe added to the product after mixing was about 100 mg/l. Product effluents obtained under these conditions invariably contained <0.005 mg/l. of Cr(VI).

The competing reaction of oxidation of $Fe(OH)_2$ by dissolved oxygen probably accounts for the decreased efficiency of reduction of Cr(VI) to Cr(III) at low concentrations. With a dissolved O_2 concentration of 6.5 mg/l. in the blowdown, the amount of Fe(II) consumed by the reaction:

$$4Fe(OH)_2 + O_2 + 2H_2O \rightleftarrows 4Fe(OH)_3 \quad (6)$$

would be 45 mg/l. Although this reaction has a $\Delta G°$ of -22.1 kcal/mol of Fe, it is slower and secondary to reaction 1 where $\Delta G°$ is -12.8 kcal/mol of Fe (Latimer, 1952).

Removal of Cr(III). Data were obtained on soluble Cr(III) remaining in electrolyzed blowdown and the resulting product effluents (Table IV). Determinations are reported only for products in which Cr(VI) was present in concentrations of <0.005 mg/l. and filterable flocs were obtained. Untreated blowdown pH values were in the

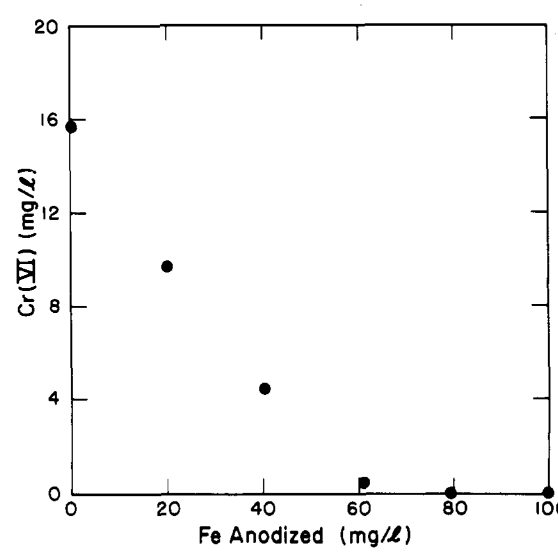


Figure 2. Removal of Cr(VI) by beaker electrolysis at 1 A. Fe was anodized at a rate of 17.4 mg/min

Table 1. Removal of Cr(VI) by Batch Electrolysis at 1 Ampere

Elect. time, min.	Fe anodized, mg/l.	Starting Cr(VI), mg/l.	Product Cr(VI), mg/l.	Cr(VI) Removal, %	Efficiency of removal, %[a]
6.0	58	13.77	1.42	89.7	79
6.0	61	15.59	0.37	97.6	84
7.0	68	15.48	<0.005	>99.96	75
8.0	79	13.77	<0.005	>99.96	57
8.0	79	15.59	<0.005	>99.96	65
10.0	101	15.48	<0.005	>99.96	50

[a] Computed on the basis of 3 moles of Fe(II) per mole of Cr(VI).

Table II. Partial Reduction of Cr(VI) in Flow Cell at 2.5 Amperes

Flow rate, l./min	Fe anodized, mg/l.[a]	Starting Cr(VI), mg/l.	Cr(VI) removal, %	Efficiency of removal, %
1.50	22.2	13.28	45.7	99.9
1.50	22.2	14.28	45.7	96.4
1.50	22.2	13.10	50.6	98.1
1.50	22.2	13.45	54.3	100.0
1.95	28.9	14.13	59.1	93.7
1.95	28.9	12.96	62.7	92.4

[a] Computed from Faraday's law for 2-electron oxidation.

Table III. Removal of Cr(VI) by a Mixing Procedure[a]

Volume mixing ratio	Fe added, mg/l.	Starting Cr(VI), mg/l.	Product Cr(VI), mg/l.	Cr(VI)removal, %	Efficiency of removal, %
4.39	60	13.45	0.62	95.4	74
4.39	60	13.10	0.21	98.4	72
3.51	79	14.28	0.053	99.6	59
3.10	84	15.48	0.006	99.96	61
2.33	106	13.28	<0.005	>99.96	41

[a] One batch was electrolyzed 2.5 A and 1.95 l./min to give Fe content of 22 mg/l., then mixed with second batch which was electrolyzed at 24 A and 1.50 l./min to give Fe content of 278 mg/l.

Table IV. Concentrations of Cr(III) in Electrolyzed Blowdown and in Product Effluent after Mixing

Electrolyzed blowdown		Product effluent	
Fe anodized mg/l.	Cr(III), mg/l.	Fe added, mg/l.	Cr(III), mg/l.
278	0.005	103	0.035
278	<0.005	106	0.017
231	<0.005	110	0.038
278	<0.005	132	0.021
278	<0.005	139	0.123
303	0.013	152	0.107

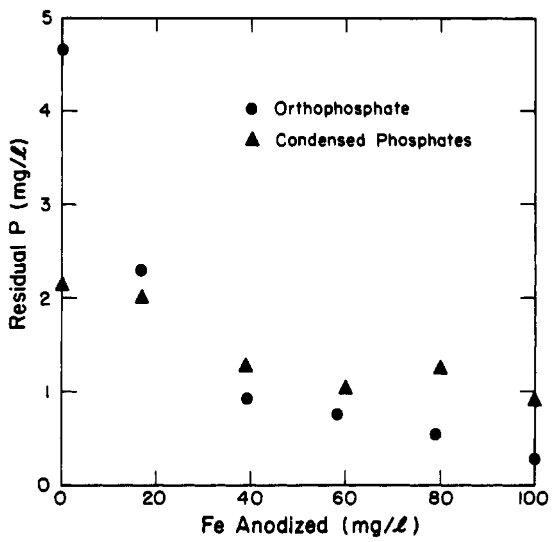


Figure 3. Removal of phosphates by beaker electrolysis at 1 A

range of 6.0–6.6 and product pH values were in the range of 6.8–7.8.

The concentrations of Cr(III) were low when large amounts of Fe were anodized in the blowdown, but the product effluents from mixing contained considerably more Cr(III). Adjustment of pH either before or after electrolysis possibly would improve Cr(III) removal.

Removal of Phosphates. Measurements were made on removal of soluble orthophosphate and soluble condensed phosphates. Figure 3 shows removal of phosphates from blowdown in a typical batch electrolysis. Figure 4 shows orthophosphate removal with respect to Fe anodized, and Figure 5 is a similar plot for condensed phosphate removal. Condensed phosphates were removed less efficiently than orthophosphate.

Residual orthophosphate concentrations after electrolysis (Figure 3) were similar to those measured by Recht and Ghassemi (1970) under comparable conditions by chemical precipitation with Fe(III) salts. For example, at pH 7.1 with a 2:1 Fe:P ratio, the residual orthophosphate concentration measured by Recht and Ghassemi (1970) was 1.8 mg/l. P, compared to the value of 2.3 mg/l. in Figure 3 for the same 2:1 Fe:P ratio. The residual orthophosphate concentration apparently is determined primarily by solubility limitations of Fe(III) orthophosphate.

Reduction in Total Dissolved Solids (TDS). Product effluents were definitely improved with respect to TDS. Data for flow cell runs are shown in Figure 6 with percentage reduction in TDS plotted as a function of Fe anodized. Substantial reductions averaging 22% were obtained for about 100 mg/l. of Fe, and larger reductions averaging 40% were measured for 280 mg/l. of Fe. A surplus of electrochemically generated precipitate is significantly beneficial for product effluent quality with respect to TDS.

Reagent and Energy Costs. Removal of Cr(VI) to a concentration of <0.01 mg/l. would require about 0.8 lb of

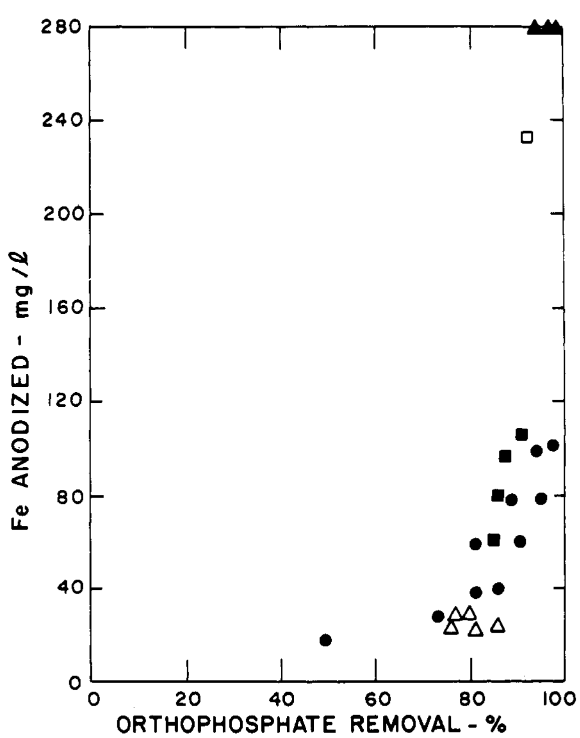


Figure 4. Removal of orthophosphate by electrolysis. Mean concentration in untreated blowdown was 5.67 mg/l. P

● 1-A beaker electrolysis product, △ 2.5-A flow cell electrolysis product, □ 20-A flow cell electrolysis product, ▲ 24-A flow cell electrolysis product, ■ 24-A flow cell electrolysis product mixed with 2.5-A flow cell electrolysis product

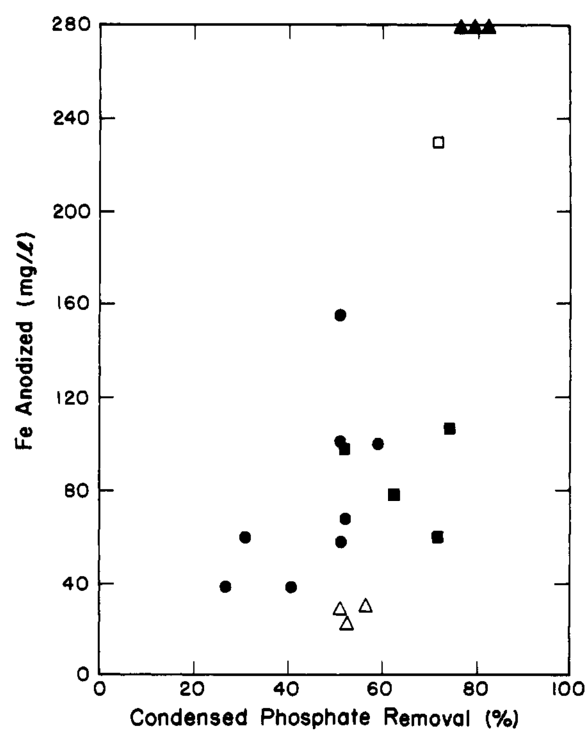


Figure 5. Removal of condensed phosphates by electrolysis. Mean value in untreated blowdown was 2.64 mg/l. P

● 1-A beaker electrolysis product, △ 2.5-A flow cell electrolysis product, □ 20-A flow cell electrolysis product, ▲ 24-A flow cell electrolysis product, ■ 24-A flow cell electrolysis product mixed with 2.5-A flow cell electrolysis product

LPRSA0159815

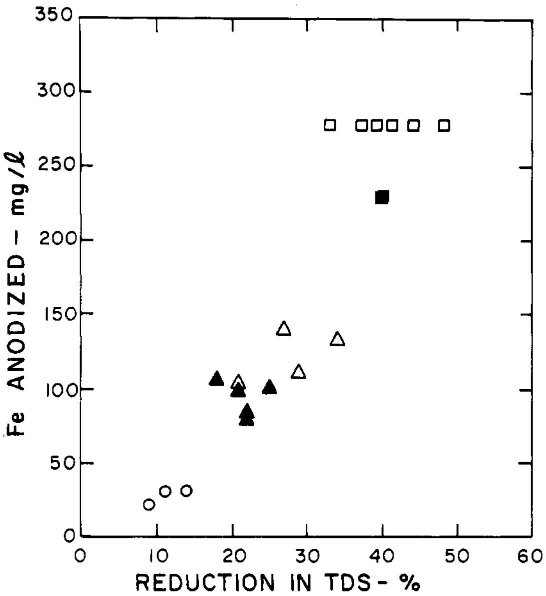


Figure 6. Reduction in total dissolved solids for blowdown feeds initially containing 720 to 990 mg/l. TDS

○ 2.5-A electrolysis product, □ 24-A electrolysis product, ■ 20-A electrolysis product, △ 24-A electrolysis product mixed with untreated blowdown, ▲ 24-A electrolysis product mixed with 2.5-A electrolysis product

low carbon steel per 1000 gal of product effluent. At a cost of 12 cents per lb, the Fe reagent cost would be about 10 cents per 1000 gal of product effluent, exclusive of shipping and handling costs.

Approximately 2 kwh (dc) per 1000 gal of product effluent would be required for a driving potential of 5 V.

Significance of Results

Recently many users of the proved chromate corrosion-prevention method have chosen to abandon it rather than go to the expense of special waste-treatment facilities. In the long run, this may not be an economically desirable course, because the substitute materials may prove more expensive than the continued use of Cr(VI) products coupled with effluent cleanup facilities. Furthermore, many users of Cr(VI) chemicals such as electroplaters have no alternative but to install effluent treatment facilities.

The electrochemical ferrous hydroxide precipitation process is worthy of further study and development because it offers a means of effectively removing total chromium while, at the same time, reducing phosphate by 80% or more and reducing TDS by up to 40%.

Primary advantages of the method are: Reduction and precipitation are done concurrently without adjustment of pH. Extraneous soluble ions are not added to increase TDS and also increase reagent cost. (There is a beneficial decrease in TDS by co-precipitation of Fe and Cr compounds in the flocs.) Reagent is added accurately and simply by controlling feed flows and current flows, and can be done in the steady-state mode for automated operation.

Disadvantages of the method are: Stable colloids are formed under most conditions which usually are optimum for quantitative Cr(VI) removal. Excessive amounts of anodized Fe are required for quantitative Cr(III) precipitation (<0.01 mg/l), and for maximum improvement in TDS. Direct current power is required.

Acknowledgment

The chromate removal problem was suggested by R. I. Brasier who also provided valuable counsel. R. J. Bard, Kermit L. Holman, and W. S. Nichols contributed valuable advice. Technical assistance was provided by New Mexico State University Cooperative students Douglas J. Roberts and Henry L. Horak.

Literature Cited

Air, Water News, Aug. 30, 1971, p 6.
American Public Health Association, "Standard Methods for the Examination of Water and Wastewater," 12th ed., 1965.
Balden, A. R., *Sewage Ind. Wastes,* **31,** 934 (1959).
Bockris, J. O'M., Genshaw, M. A., Bursic, V., Wroblowa, H., *Electrochim. Acta,* **16,** 1859 (1971).
Carls, B. H., Schieber, J. R., "Secondary Treatment Methods for Cooling Tower Blowdown," Betz Laboratories, Inc., Trevose, Pa., 1971.
Hine, Fumio, Jap. Patent 69,05,696 (March 10, 1969); *Chem. Abstr.,* **71,** 128456*m* (1969).
Lancy, L. E., U.S. Patent 3,294,680 (Dec. 27, 1966).
Latimer, W. M., "Oxidation Potentials," second ed., Prentice-Hall, Englewood Cliffs, N.J., 1952.
Miller, H. C., Knipe, W., "Electrochemical Treatment of Municipal Waste Water," AWTR-13, U.S. Dept. HEW, Public Health Service (1965).
Prod. Finish. (Cincinnati), **34** (6), 92 (1970).
Recht, H. L., Ghassemi, Masood, "Kinetics and Mechanism of Precipitation and Nature of the Precipitate Obtained in Phosphate Removal from Wastewater Using Aluminum(III) and Iron(III) Salts," *Water Pollut. Contr. Res. Ser.,* 17010EKI 04/70, U. S. Dept. of the Int., FWQA, 1970.
Sadek, S. E., "An Electrochemical Method for Removal of Phosphates from Waste Waters," *Water Pollut. Contr. Res. Ser.,* 17010, U. S. Dept. of the Int., FWQA, 1970.
Selm, R. P., Hulse, B. T., U.S. Patent 3,027,321, March 27, 1962.
Siegerman, Howard, *ChemTech,* November 1971, p 672.
Stumm, Werner, O'Melia, C. R., *J. Amer. Water Works Ass.,* **60,** 514 (1968).
Uhlig, H. H., "Corrosion and Corrosion Control," Wiley and Sons, New York, N.Y., 1962, p 226.

Received for review June 16, 1972. Accepted December 19, 1972. Work was done under the auspices of the United States Atomic Energy Commission.

ATTACHMENT 20

EPA-450/3-87-010a

Chromium Emissions from Comfort Cooling Towers — Background Information for Proposed Standards

Emissions Standards Division

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office Of Air And Radiation
Office Of Air Quality Planning And Standards
Research Triangle Park, North Carolina 27711

March 1988

1. SUMMARY

Regulations for chromium (Cr) emissions from comfort cooling towers (CCT's) are being developed because hexavalent chromium (Cr^{+6}), the form of Cr used in CCT's, is considered to be a potent carcinogen. Nationwide annual Cr emissions from CCT's are estimated to be about 7.2 to 206 Megagrams (16,000 to 453,000 pounds) (based on an average nationwide utilization rate of 46 percent). These emissions result in a health risk estimate of 4 to 112 cancer cases per year. This range reflects the lower- and upper-bound emission estimates and the upper-bound unit risk factor.

Two regulatory alternatives were evaluated for CCT's: nonchromium option and a high-efficiency drift eliminator option (HEDE). The least burdensome regulatory alternative is a standard that prohibits the use of chromium-based chemicals in CCT's and the sales of these chemicals for use in CCT's. Such a standard can reduce the risk by 100 percent, and this benefit can be achieved without operating problems or unreasonable costs.

A standard requiring retrofit of existing CCT's with HEDE's would be less effective (85 percent reduction in risk, or less). In addition, implementation of an HEDE standard would be impossible at some existing sites because of tower configuration. Where retrofit would be possible or in new CCT's, an HEDE standard would be much more complex than switching to nonchromium treatment. An annual inspection of the drift eliminator for proper sealing with the tower structure and an initial certification program to verify that selected drift eliminators can achieve the required emission rate would be required. This inspection and certification process would be more costly for operators than switching to nonchromium treatment programs. Furthermore, the certification process may take several years to complete.

Comfort cooling towers are used extensively as components of heating, ventilation, and air conditioning (HVAC) or refrigeration systems. The HVAC systems are installed in hospitals; hotels; shopping malls; and office, educational, and other commercial buildings. Refrigeration systems are used for ice skating rinks, cold storage (food) warehouses, and other commercial operations.

Hexavalent chromium is used in CCT water to inhibit corrosion in the heat exchanger of the HVAC or refrigeration equipment and in the connecting piping. Hexavalent chromium has long provided the best corrosion protection at a reasonable cost. However, environmental concerns (primarily wastewater discharges) have prompted many operators to switch to nonchromate water treatments. Currently, an estimated 75 to 90 percent of the 250,000 CCT's nationwide use nonchromium treatment programs or no water treatment. Although the remaining CCT's do not operate under special conditions that require the use of Cr^{+6}, many operators are reluctant to change from a treatment procedure with which they are familiar to one that will require more attention to achieve the same results.

A regulation eliminating Cr^{+6} emissions from CCT's is most effectively accomplished under Section 6 of the Toxic Substances Control Act (TSCA). Under TSCA, both owner/operator use of Cr^{+6} in CCT's and vendor sales of Cr^{+6} for use in CCT's could be prohibited. Under the Clean Air Act (CAA), the thrust of the rule would be on compliance by the owners and operators of the CCT's. The population of distributors (20+ major and approximately 400 total) is much smaller than the population of CCT's (approximately 250,000) that would have to be inspected to ensure implementation of the standard. Thus, TSCA is the best authority for regulating the use of Cr^{+6} chemicals in CCT's. By prohibiting the sales of the chemicals and also making the chemical sales companies liable, it is expected that the burden of ensuring compliance with the regulation would be reduced for both EPA and owners/operators of CCT's.

3. COMFORT COOLING TOWERS

3.1 GENERAL

This section provides a description of the source category and the major users of comfort cooling towers (CCT's); the cooling tower system; heating, ventilating, and air conditioning (HVAC) and refrigeration systems served by the cooling towers; cooling water chemical treatment programs; the mechanism by which hexavalent chromium (Cr^{+6}) is emitted, and the emission control techniques.

3.2 DEFINITION OF SOURCE CATEGORY

There are two broad categories of cooling towers, comfort and industrial. Comfort cooling towers are used to maintain a specified environment or refrigeration system. Industrial process cooling towers are used to control the temperatures of process fluids in industrial production units. The EPA is evaluating industrial towers separately because the cooling system conditions under which industrial towers operate may make controlling corrosion in an industrial tower more complex and difficult. The conditions that distinguish these towers and that make controlling Cr^{+6} emissions from CCT's less difficult than controlling Cr^{+6} emissions from industrial towers include a lower potential for corrosion because lower water temperatures typically are encountered; a lower utilization rate; the extensive use of heat exchangers constructed of copper, which is less susceptible to corrosive attack; little opportunity for upsets in the chemical treatment programs from contamination of the cooling water; and a lower potential for significant economic loss should alternative chemicals not perform satisfactorily. Usually only one heat exchanger is integrated into a single cooling tower system in CCT systems whereas a single industrial tower may support many heat exchangers.

Comfort cooling towers are used in all States in the U.S., primarily in urban areas. Major users of CCT's with HVAC systems include hospitals, hotels, educational facilities, office buildings, and shopping malls. Refrigeration systems that may operate with CCT's include ice skating rinks, cold storage (food) warehouses, and other commercial operations. Estimates from the two largest manufacturers of cooling towers (each represents a 40 percent market share) indicate that the nationwide population of CCT's is between 200,000 and 300,000.[1,2] An estimate slightly lower than 200,000 was provided by a smaller, regional manufacturer.[3] The 300,000 estimate was provided by the manufacturer that appears to have the higher percentage of the CCT market. Water treatment vendors estimated that 10 to 25 percent of CCT's use chromium-based water treatment chemicals.[4-6] For analysis purposes, it is assumed that the nationwide population of CCT's is 250,000 units and that 15 percent of CCT's (about 37,500) use chromium-based water treatment chemicals. Hexavalent chromium use in CCT's appears to be distributed randomly across the country.

3.3 COMFORT COOLING SYSTEM COMPONENTS

3.3.1 Cooling Tower

Cooling towers are devices that cool warm water by contacting it with ambient air that is drawn or forced through the tower. For most cooling towers, about 80 percent of the cooling occurs from evaporation of water as the air flowing through the tower contacts water cascading from the top to the bottom of the tower.[7] Most tower systems are designed with recirculating water systems to conserve water resources or reduce costs of purchasing water. Typically, the CCT is an open recirculating system, but some are closed recirculating systems. The major cooling tower components include the fan(s), fill material, water distribution deck or header, drift eliminator, structural frame, and cold water basin. Other components that affect tower operation include the pumps and pipes necessary to circulate the cooling water through the cooling tower and heat exchanger loops.

Cooling towers are designed with mechanically induced-, mechanically forced-, or natural-draft airflow. Induced draft is provided by a propeller-type fan located in the stack at the top of the tower.

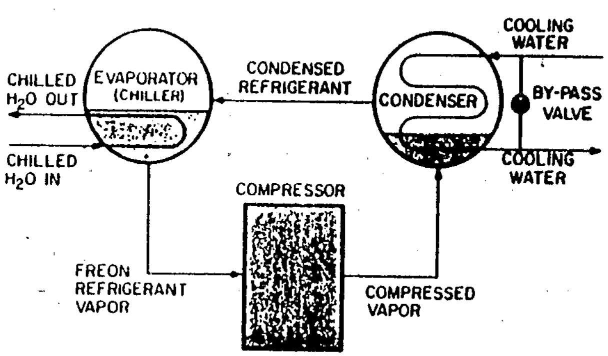
can be either a compression-cycle or an absorption type (see Figure 3-4). In both systems, cooling water is required to condense the refrigerant vapor (i.e., Freon® in a compression-cycle system and water in most absorption-type systems). (Note: Water-ammonia compression systems also have been used with ammonia as the refrigerant. However, in HVAC systems, water/lithium bromide compression systems predominate.) In the absorption system, cooling water also is required for the absorber. Water is supplied from a cooling tower at about 29°C (85°F), and it returns to the tower at about 35°C (95°F). The condenser typically is constructed of copper tubes and a cast steel shell. The condensed refrigerant passes to the evaporator where warm water from the air handling units transfers heat that evaporates the refrigerant, thereby chilling the water. The chilled water is pumped back to the air handling units.[8,9]

The required tower size for a given air conditioning load depends on the type of chiller system used. Compression-type equipment is designed for a temperature difference of 5.6°C (10°F) across the tower and a recirculating rate of 11.6 liters per minute (ℓ/min) (3 gallons per minute [gal/min]) per ton of air conditioning. Absorption-type equipment is designed for a temperature difference of 8.3°C (15°F) across the tower and a recirculating rate of 15.1 ℓ/min (4 gal/min) per ton of air conditioning. A ton of air conditioning is defined as 3,514 Watts (W) (12,000 Btu/hour [h]). Compression-type equipment will reject 4,392 W (15,000 Btu/h) to the cooling tower because for each ton of air conditioning, an additional 878 W (3,000 Btu/h) is required to perform the work needed to compress the refrigerant. When absorption-type equipment is used, 8,785 W (30,000 Btu/h) are rejected at the cooling tower for each ton of air conditioning because 5,270 W (18,000 Btu/h) are required to drive the process. Water is evaporated at the rate of 7.2 ℓ (1.9 gal) and 14.0 ℓ (3.7 gal) per hour per ton of cooling in the cooling towers used with compression and absorption systems, respectively.[10]

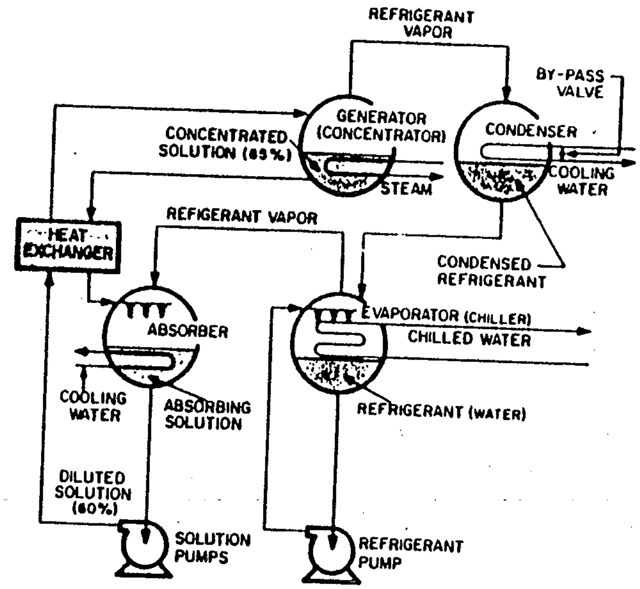
3.4 CHEMICAL TREATMENT PROGRAMS

3.4.1 Purpose

Chemicals are added to the recirculating cooling water to inhibit the corrosive effects of the water, to control the rate of scaling and fouling, and to control the growth of micro-organisms in both the cooling tower and the heat exchangers. As evaporation occurs during cooling, the



COMPRESSION-CYCLE
COOLING SYSTEM



ABSORPTION-TYPE
COOLING SYSTEM

Figure 3-4. Cooling systems served by comfort cooling towers.
(Reprinted from Reference No. 10)

chemical constituents of the water become concentrated. A percentage of the recirculating water is intentionally discharged (blowdown) to maintain acceptable concentrations of suspended and dissolved solids. Also, as water cascades through the tower, some is entrained and emitted from the stack as drift. Fresh water is added to make up for the losses resulting from evaporation, blowdown, and drift.

Typical water treatment program chemicals include (1) a corrosion inhibitor, (2) an antiscalant, (3) an antifoulant, (4) a dispersant, (5) a surfactant, (6) a biocide, and (7) an acid and/or caustic soda for pH control. Chromium-based chemicals are corrosion inhibitors. Other chemicals fall into one or more categories, and many combinations of various chemicals are used. The quality of the cooling tower water supply directly affects the type and quantity of chemicals required to maintain satisfactory protection. The three problems--corrosion, scaling and fouling, and microbiological growth--and the chemicals used to control them are discussed later in this section.

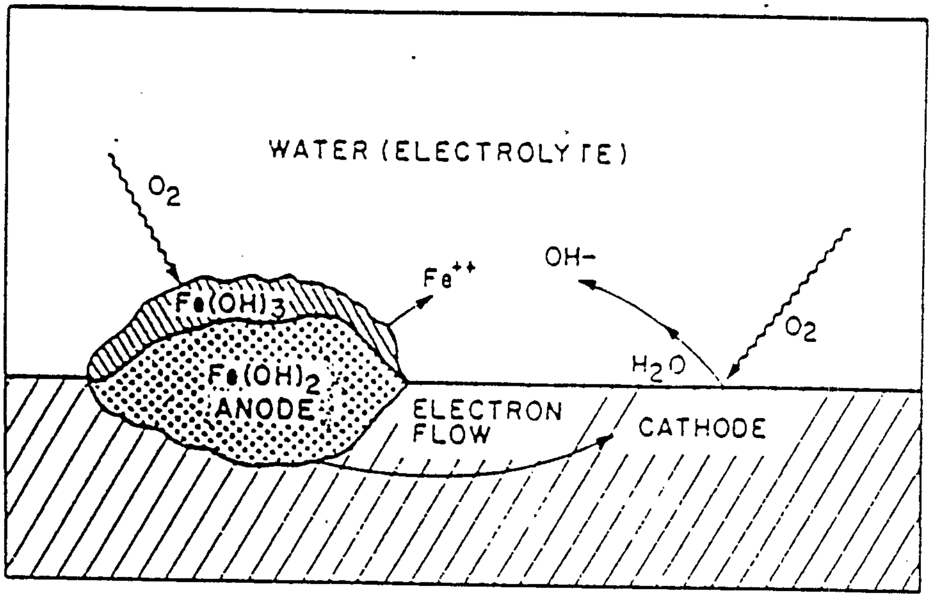
Major water chemistry parameters that affect the selection of chemical treatment programs include pH, calcium hardness (calcium ion concentration), alkalinity (bicarbonate, carbonate, and hydroxide ions), chloride, sulfate, silica, dissolved solids (conductivity), and suspended solids. Water quality also directly affects the number of cycles of concentration that can be maintained. The number of cycles of concentration is defined as the ratio of conductivity or calcium hardness of the recirculating water to that of the makeup water. The maximum level of either parameter established is based on the chemical treatment program and the acceptable rates of corrosion and scaling.

3.4.2 Corrosion.

3.4.2.1 Description. Corrosion is the oxidation of a metal by some oxidizing agent in the environment. The area over which metal is oxidized (corroded) is called the anode; the area over which the oxidizing agent is reduced is called the cathode. Many metals contain both anodic and cathodic areas. As corrosion proceeds, electrons flow through the metal from the anode to the cathode. In water, an electrochemical cell is formed as cations migrate toward the cathode and anions move toward the anode. The water is the conducting fluid or electrolyte. The flow of electrons through the metal (external circuit) is the corrosion current, which is limited by the rate at which electrons are accepted by the oxidizing agent at the cathode. Figure 3-5 illustrates the mechanisms for corrosion in a single metal. Galvanic corrosion occurs when two different metals are in physical contact. Depending on their relative characteristics, one of the metals will function as an anode and the other as a cathode, and the anodic metal will corrode. Conditions that increase the conductivity of the water (e.g., high dissolved solids content or high temperature) increase the rate of corrosion.

Several types of corrosion occur in cooling water systems including general etching, pitting, tuberculation, and crevice corrosion. The least harmful is the general etching that occurs uniformly over the surface of the metal. Pitting is the formation of small holes from corrosive attack at the metal surfaces, and tuberculation refers to the corrosion products cap that forms over a pit. Crevice corrosion occurs where metallic and nonmetallic materials contact. Corrosion can be retarded, but not totally prevented, and the rate of corrosion that is acceptable varies among systems. Inhibitors are added primarily to protect the heat transfer surfaces, which are the most critical metal components in the system, from corrosion. The terms and corrosion rates presented in Table 3-1 are generally used to describe the severity of carbon steel and copper corrosion.

Chemicals used in a recirculating water system are either anodic or cathodic corrosion inhibitors, and the mechanisms by which they protect the metal are passivation, precipitation, and/or adsorption. Anodic corrosion inhibitors function by providing a barrier film or deposit at anodic areas that prevents the electrolytic half-cell reaction from occurring. Cathodic inhibitors prevent the other half-cell reaction from occurring by providing a barrier film or deposit at cathodic areas. Table 3-2 lists various anodic and cathodic inhibitors. The barrier created by passivation is an oxide that forms on the metal surface, and the barrier created by precipitation is an insoluble precipitate that coats the metal surface. Generally, anodic inhibitors are passivators, and cathodic inhibitors are precipitators. Molecules that have polar properties provide a barrier by adsorbing on the entire metal surface. Adsorption inhibitors are usually organic compounds.[10-12]



ANODIC REACTIONS

$Fe \rightarrow Fe^{++} + 2e^-$

$Fe^{++} + 2OH^- \rightarrow Fe(OH)_2$ (soluble form)

$Fe(OH)_2 + H_2O + \frac{1}{2}O_2 \rightarrow 2\ Fe(OH)_3$ (insoluble red-brown deposit)

CATHODIC REACTIONS

$2e^- + 2H^+ \rightarrow H_{2gas}$

$1\frac{1}{2}H_2 + O_{2gas} \rightarrow H_2O + OH^-$

Figure 3-5. Corrosion mechanism on carbon steel surface.
(Reprinted from Reference No. 10)

TABLE 3-1. CORROSION RATES OF METALS[12]

Description	Corrosion rates, μm/yr (mil/yr)	
	Carbon steel	Copper alloy
Negligible	<25.4-50.8 (<1-2)	<2.54 (<0.1)
Mild	50.8-127.0 (2-5)	3.81-5.08 (0.15-0.2)
Moderate	127.0-254.0 (5-10)	5.08-8.89 (0.2-0.35)
Severe	>254.0 (>10)	12.7-25.4 (0.5-1)

3.4.2.2 Chromium-Based Inhibitors. Chromates historically have provided the best protection against corrosion for the money and effort. Very little monitoring and control of concentration are required. Even if the inhibitor feed is temporarily interrupted, the existing film will continue to provide protection for several days.

Chromate concentration typically must be maintained above 200 parts per million (ppm) if the chromates are used alone in the recirculating water. However, chromates (which are anodic inhibitors) typically are used in combination with cathodic inhibitors. In these combinations, less chromate provides the same corrosion protection that is provided by high concentrations of chromate alone. Vendors provide many chromate-based combinations for use in CCT's; and definitions of low-, very low-, and ultra-low-chromate concentrations vary. In all cases, the chromate concentration is less than 30 ppm. For the purposes of this document, all of these treatment program classifications will be considered low-chromate.

The chemicals most commonly added to chromate-based formulations are zinc and phosphate; but organic compounds, polysilicates, and molybdates also have been used. (The same chemicals are used in treatment programs without chromates and are discussed in greater detail in Section 5.1.1.) Table 3-3 provides concentrations and typical operating conditions of some of the formulations discussed in various publications, which generally focus on industrial tower systems.[10-12] However, at those facilities that use chromates in the CCT's, the same treatment program is used in both the CCT's and the industrial process cooling systems. Chromate is an excellent copper corrosion inhibitor, but many publications indicate that it is common to add the organic triazole inhibitors to low-chromate formulations that are used in systems with copper heat transfer surfaces; this was confirmed by some of the EPA studies of chemical treatment programs used at CCT's (case studies).[13-17] However, this does not mean that triazoles are more effective or even as effective as chromate at protecting copper from corrosion. The addition of triazoles also protects copper surfaces from reactions with phosphonate dispersants.

The cathodic half-cell reaction controls the rate of corrosion at the anode. Thus, for a given cathodic reaction rate, the same mass of the anode will corrode. If the cathodic reaction is not controlled by

TABLE 3-2. ANODIC AND CATHODIC CORROSION INHIBITORS

Anodic	Cathodic
Chromate	Polyphosphate
Molybdate	Zinc
Orthophosphate	Polysilicate
Nitrites	
Orthosilicate	

TABLE 3-3. CHROMATE-BASED CORROSION INHIBITORS[10-12,18]

Combination[a]	Concentration, ppm[b]	Operating conditions
Chromate/zinc	5-20/2.5-10	pH 6.5-7.0
Chromate/orthophosphate	20-25/3-3.5 5-10/10	pH 7.0-7.5 pH 6.2-6.8
Chromate/phosphate/zinc[c]	15-25/2-5/2-5	pH 6.0-7.0
Chromate/polyphosphate/zinc	10-30/3-5/3-5	pH 6.5-7.0 CaH 100-600 ppm[d]
	20-25/5-10/2.5-3.0	pH 6.0-6.5 CaH <400-600 ppm
	5/10/unk	pH 6.5-7.2
Chromate/zinc/phosphonate	15-25/2-4/3-5 2-3/2-3/5-10	pH 6.5-7.5 pH 6.5-7.0
Chromate/phosphonate	5-10/3-5	Not specified
Chromate/phosphonate/dispersant	5-15/2-6/2-6	pH 7.5-8.5
Chromate/dispersant	3-5/30	pH 7.5-8.5
Chromate/polysilicate	5-10/5-10	pH >7.5 Si <10 ppm
Chromate/zinc/dispersant	10-20/1-2/1.5-10	pH 7.0-9.0
Chromate/molybdate	10-30/1-5	pH >7.5

[a]In all combinations except chromate/polysilicate, the organic triazole corrosion inhibitors should be included at 1 to 10 ppm when the system contains copper.
[b]The components of some combinations can be formulated differently for different applications.
[c]Polyphosphate and/or orthophosphate.
[d]CaH is calcium hardness.

cathodic inhibitors or triazoles and if only small spots of the anodic surface remain unprotected, pitting may occur. Although chromate is an excellent inhibitor, the likelihood that small areas will remain unprotected is greater with lower chromate treatments than it is with higher chromate treatments.

3.4.3 Scaling and Fouling

3.4.3.1 Description. Scale formation occurs when dissolved solids and gases in cooling water reach their limit of solubility and precipitate out onto piping and heat transfer surfaces. Fouling occurs when deposits of dirt, leaves, and/or flocs of insoluble salts or hydrous oxides from corrosion agglomerate in the heat exchanger tubes. Scaling reduces the heat transfer capacity of heat exchangers, and fouling hinders the flow of water through heat exchangers. These conditions also contribute to pitting-type corrosion by creating corrosion cells and preventing the corrosion inhibitor from contacting the surface of the metal. Calcium carbonate is the most common scale found in cooling water systems, but calcium sulfate and calcium phosphate also can be formed in many systems. All three scales become less soluble, and, therefore, more likely to precipitate at higher temperatures. Calcium sulfate is more likely to precipitate at lower pH and the other two scales are more likely to precipitate at higher pH. Control of scaling and fouling depends on the control of deposition onto surfaces. The deposition can be affected by changing the solubility of scale-related salts, reducing the crystalline growth capacity of scale-related salts, and dispersing constituents that form fouling-related flocculations.

3.4.3.2 Antiscalants and Antifoulants

Chemical compounds that are commonly used and are the most effective in controlling the rate of scaling include polyphosphates and phosphonates. These compounds reduce the crystalline growth capacity of calcium salts. Certain phosphonate compounds affect the solubility of the calcium salts and reduce the formation of scale. Polymeric dispersants (with a molecular weight less than 20,000) reduce the potential for fouling.[10-12]

The phosphonates typically are added to chromate-zinc formulations as an alternative to phosphate, and scaling is better controlled than it is with phosphate. Also, the amount of chromate can be reduced since the phosphonate system can be operated at a slightly higher pH.

The powerful oxidizing potential of chlorine can promote corrosion of copper if phosphonates also are present in the system. The addition of benzotriazole (or other azoles) and dispersants can minimize this effect. Phosphonates are also subject to biological oxidation, which results in the release of orthophosphate ions that can cause fouling as well as reduction of the recommended concentration of phosphonate. However, this fouling problem is much less severe than that produced in systems treated with polyphosphates.[12]

3.4.4 Microbiological Control

Three types of microorganisms are found in cooling tower water systems: bacteria, fungi, and algae. Bacteria are dispersed in the water, fungi invade wood components, and algae attach to surfaces in the tower. Slime produced by bacteria can coat and aggregate debris on heat exchanger surfaces, thereby reducing the efficiency of heat transfer. Biological deposits on metal surfaces also can accelerate pitting corrosion. Fungi can cause decay of wood either by surface attack (soft rot) or internal attack of the cellulose (white rot). Algal growth can coat the fill material and reduce the effectiveness of the water droplet formation and, thus, the effectiveness of heat transfer in the tower.

Microbiocides can be classified as oxidizing agents, enzyme poisons, organic chemical compounds, and miscellaneous compounds. The oxidizing agents include chlorine, bromine, and iodine. Enzyme poisons include methylene bisthiocyanate, acrolein, and heavy metals (e.g., copper sulfate, copper citrate, tin, phenylmercuric acetate, methyl mercury). Acrolein and the heavy metals are not widely used and are not known to be used in CCT's. Organic compounds normally require high dosage rates and include dodecylquamidine hydrochloride and quaternary ammonia salts. Most microbiocides used for treating cooling water are included in the categories above, but dithiocarbamates are a class of miscellaneous compounds that also are effective microbiocides. However, they reduce chromate and, thus, cannot be used in chromate-treated systems.[10,12]

Organic chemical compounds which either hydrolyze to relatively nontoxic forms or can be detoxified are also used as micobiocides. Hydrolyzable materials include 2,2-dibromo-3-nitrilopropionamide, chlorinated cyanurates, and halogenated hydantoins. Chemicals which are both hydrolyzable and detoxifiable are methylene bis-thiocyanate and bromonitrostyrene. Isothiazolin is a widely used biocide that can be detoxified.[10,18]

3.5 MAINTENANCE REQUIREMENTS

The maintenance requirements for CCT's and associated heat exchangers are affected by the effectiveness of the chemical treatment programs. The effectiveness of the corrosion inhibitor is important to the life expectancy of metal surfaces exposed to the recirculating water in both the tower and heat exchanger. Excessive corrosion will cause premature replacement of equipment and additional maintenance. Metal structural components of the tower such as steel columns and beams, connector plates and bolts, piping and pumps, valves, and controller equipment corrode from exposure to the cooling tower water. However, the most critical corrosion occurs in the heat exchangers. Many CCT operators have Eddy-current tests conducted periodically (every 1 to 5 years) to detect heat exchanger tubes in danger of failing, and these tubes are either replaced or plugged.[19-25] Some loss of efficiency or cooling capacity because of plugged tubes can usually be tolerated because cooling systems are often designed with a margin of safety.

Scaling occurs on the surfaces of CCT components and heat exchangers. Scaling in the CCT can reduce tower heat rejection capacity by interfering with splash or film fill water distribution and the formation of water droplets. Airflow characteristics also can be altered when airflow passages in the fill and drift eliminator become blocked; this increases the pressure drop across the system and reduces cooling efficiency. The tower fill and drift eliminator surfaces typically are inspected annually and cleaned if necessary. Winter is the most common time to perform the work since the demand, if any, on the system is minimal. Scaling and fouling in heat exchanger tubes reduce the heat transfer capacity because of the low conductivity of the crystalline film created on the tube surfaces and flow restrictions that result. The scale

$$\text{Evaporation rate} = (0.00085)(\text{Recirculation rate})(\Delta T \text{ of water}) \quad (2)$$

where:

Evaporation rate [=] ℓ/min (gal/min)

4.1.5 Blowdown Rate

Blowdown rates depend on cycles of concentration as shown in Equation 3.[4] Cycles of concentration can vary widely with the treatment program used and the makeup water quality. Cycles of concentration ranging from 2 to 8 have been reported. A uniform assumption of 5 cycles of concentration (the midpoint of the range) was used for all six model towers. The assumption is supported by several CCT operators.[6,11-13]

$$\text{Blowdown rate} = \frac{\text{Evaporation rate}}{(\text{Cycles of concentration}-1)} \quad (3)$$

4.1.6 Hexavalent Chromium Emissions

Data on chromate concentrations in CCT water treatment programs vary from less than 1 ppm to 20 ppm chromate.[9,15,16] Although a large amount of data has shown that the average concentration of chromate in industrial process cooling towers is 13 ppm, there are not sufficient data on CCT systems to justify using a concentration other than the midpoint of the observed range.[17-25] Therefore, the chromate concentration in the recirculating water for the model CCT's is assumed to be 10 ppm (10 ppm chromate is equal to 4.48 ppm Cr^{+6}).

Four chromium emission factors developed from EPA-sponsored tests performed on two industrial cooling towers equipped with lower efficiency drift eliminators are presented in Table 4-2.[26,27] These emission factors relate chromium emissions to the chromium concentration in the recirculation water in units of milligrams of Cr^{+6} emitted per ppm Cr^{+6} in the recirculating water per liter of recirculating water (mg Cr^{+6}/ppm Cr^{+6}/ℓ H_2O) (pounds of Cr^{+6} emitted per ppm of Cr^{+6} in the recirculating water per gallon of recirculating water [lb Cr^{+6}/ppm Cr^{+6}/gal H_2O]). Because the product of the recirculating water flow rate and the Cr^{+6} concentration in the water is the recirculating Cr^{+6} flow rate, the emission factor also can be expressed as mg Cr^{+6} emitted/mg Cr^{+6} recirculating (lb Cr^{+6}/lb Cr^{+6}). The recirculation rates, chromate

ATTACHMENT 21

United States Patent

[11] **3,627,032**

[72] Inventors **Philip S. Glad**
Decatur;
Frank D. Parker, Sr., Atlanta; Richard W. Glad, Atlanta, all of Ga.

[21] Appl. No. **45,621**
[22] Filed **June 12, 1970**
[45] Patented **Dec. 14, 1971**
[73] Assignee **Parker Engineered Chemicals, Inc.**
Atlanta, Ga.

[54] **COOLING TOWER WATER TREATMENT SYSTEM**
9 Claims, 2 Drawing Figs.

[52] **U.S. Cl.** **165/32,** 165/95, 165/107
[51] **Int. Cl.** **G05d 23/00**
[50] **Field of Search** .... 165/95, 60, 32, 107, 12; 261/DIG. 3, DIG. 31

[56] **References Cited**

UNITED STATES PATENTS

2,859,766	11/1958	Shuldener	261/DIG. 31
3,282,277	11/1966	Hayman	261/DIG. 3
3,450,265	6/1969	Kreusch et al.	261/DIG. 3

Primary Examiner—Charles Sukalo
Attorney—Jones & Thomas

ABSTRACT: A water treatment system for a large capacity air conditioner or similar heat exchange system which includes a reservoir, a refrigeration unit, a cooling tower for spraying the water to the reservoir, and flow means for flowing water from the reservoir through the refrigeration unit to the cooling tower. Water makeup means is provided for adding additional fresh water to the reservoir, and a water drain system functions to drain away the stale water of the reservoir in response to the inflow of fresh makeup water. Chemical additive pumps function to add chemical compositions to the circulating water as makeup water is added to the system.

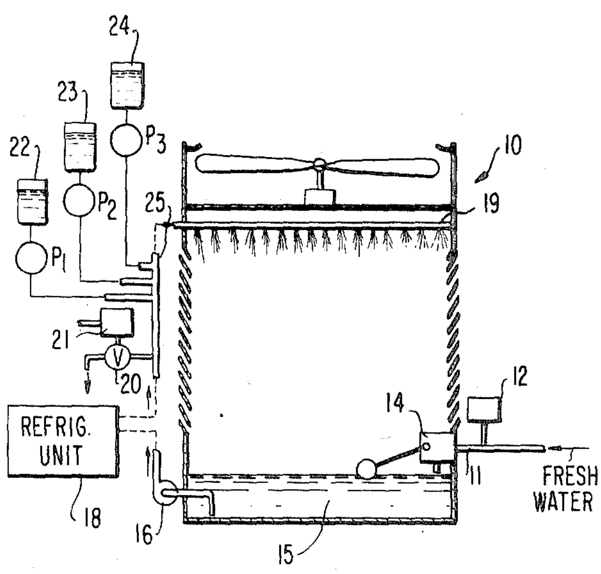


FIG. 1

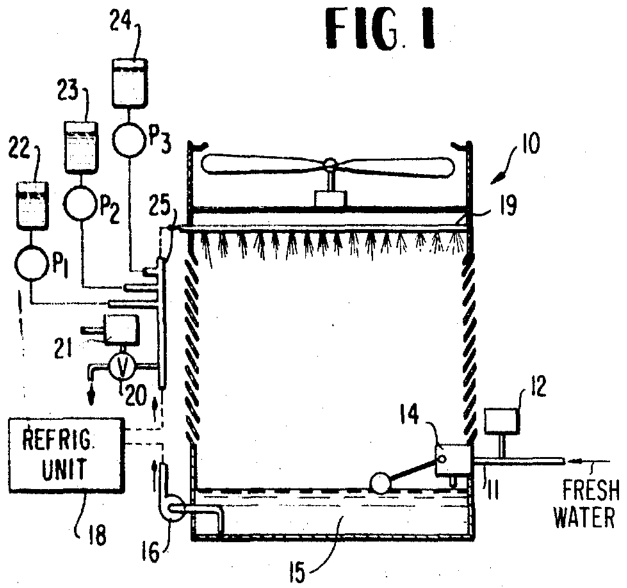
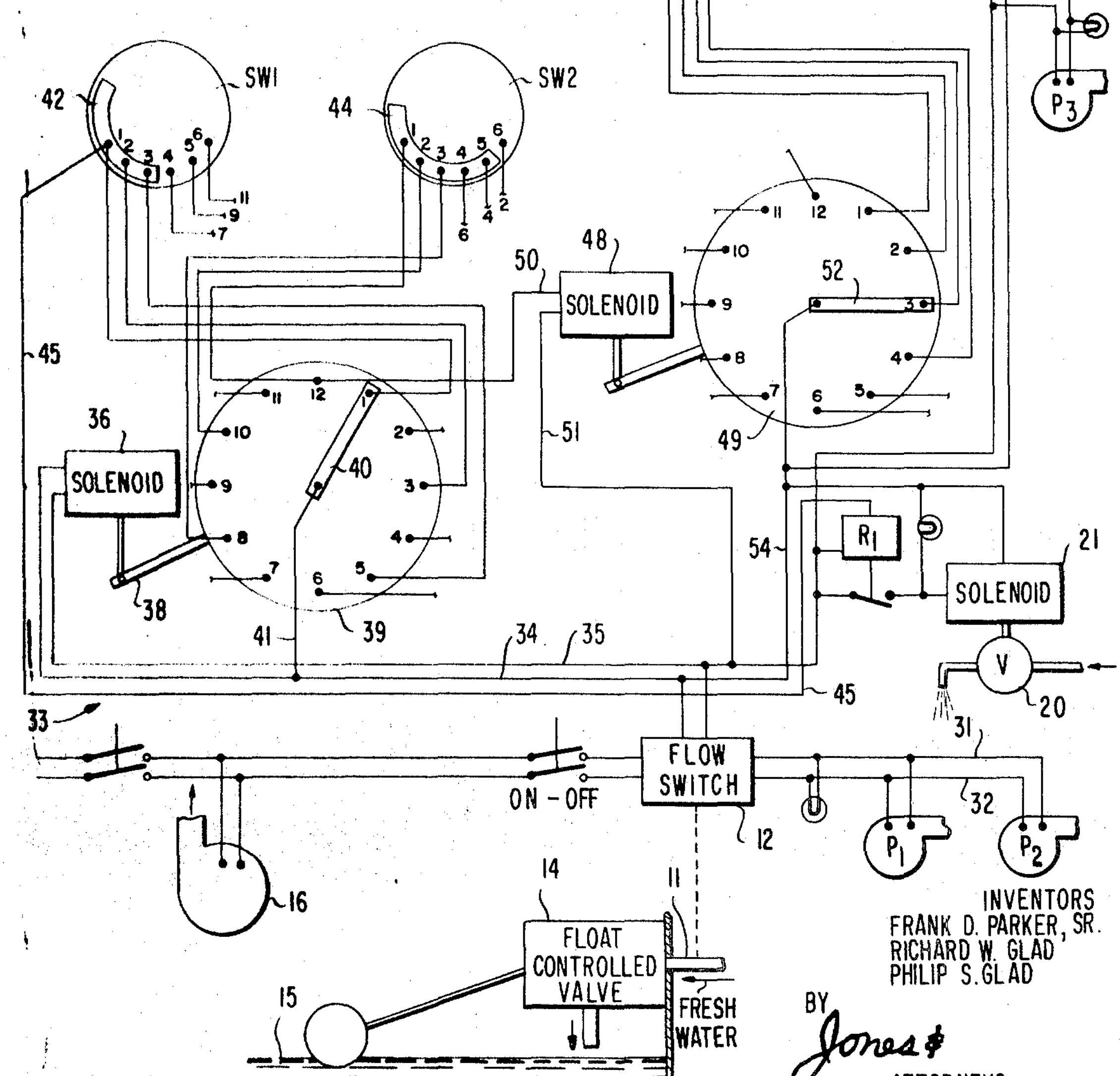


FIG. 2



INVENTORS
FRANK D. PARKER, SR.
RICHARD W. GLAD
PHILIP S. GLAD

BY Jones &
ATTORNEYS

COOLING TOWER WATER TREATMENT SYSTEM

BACKGROUND OF THE INVENTION

In the water circulation system for a large capacity air-conditioning unit, the hot water flowing from the heat exchanger of the air conditioning unit is usually directed to the upper end of a cooling tower where it is sprayed in the air down through a relatively open tower for cooling purposes. When the water reaches the reservoir at the lower end of the tower, it is available for recirculation through the system.

Water normally contains minerals and when the water is evaporated from the flow system as it flows down through the cooling tower the minerals are generally left behind and tend to accumulate in the liquid remaining in the reservoir, and the spraying of the water causes the water to become substantially saturated with oxygen. The minerals eventually drop out of solution from the saturated water and form scale on the surfaces of the cooling tower and in the conduits of the heat exchanger and other flow conduits of the system. The scale forms an insulating barrier and inhibits the transfer of heat at the heat exchanger and narrows the flow passage ways of the flow conduits. The oxygen of the water tends to react with the metal surfaces of the structure and to corrode and to otherwise deteriorate the structure. Moreover, the warm water of the system forms a breeding place for algae, bacteria, fungae, etc., which tends to block the flow system of the apparatus.

Because of these general problems, it has become customary to inject chemical compositions in the cooling tower water. These chemical compositions include scale and corrosion inhibitors and occasionally an algaecide. In the past the automated devices utilized to add these chemicals to the flow systems usually included a pump for pumping small quantities of liquid compositions into the cooling tower water as the tower pump operated to flow water from the reservoir through the heat exchanger and to the spray at the top of the cooling tower. The chemical pump thus ran continuously with the tower pump, without regard to the condition of the water in the cooling tower. Moreover, the algaecides were usually added by hand in large quantities by a maintenance man, since algaecides do not seem to work effectively when added continuously to such a system. In addition, the devices utilized a water bleed system to bleed the stale water from the cooling tower so that the stale water saturated with large quantities of minerals and chemicals could be progressively replaced with fresh water. The devices utilized to perform the water bleed function have usually been embodied in a bleed conduit that is opened by a valve in response to the operation of the cooling tower pump. Thus, the bleed of the stale water was slow and continuous and routed through a relatively small valve opening which was easily blocked by debris in the water, etc., and rendered inoperative.

In order that the addition of chemicals to the water of a cooling tower could be more responsive to the condition of the water, some devices have been developed for testing the electrical conductivity of the water and actuating a chemical pump in response to a certain level of water conductivity. These systems function properly only on a temporary basis since the device for continuously testing the conductivity of the water becomes coated with scale and becomes ineffective and inaccurate. The chemical additive system therefore becomes unreliable and requires continual maintenance.

SUMMARY OF THE INVENTION

Briefly described, the present invention comprises a water treatment system for the water circulation system of a large capacity air-conditioning system which functions to maintain the water in the system in a suitable condition for passage through the heat exchanger and into engagement with the surfaces of the flow system. Makeup water is added to the reservoir of the cooling tower to replace the water lost from evaporation and windage, and chemicals are added to the water in the flow system as the water flows from the heat exchanger to the spray means at the top of the cooling tower. The chemicals are added only during the operation of the cooling tower pump and as the makeup water enters the reservoir. Thus, when the water level in the reservoir is low, which is when the concentration of minerals and oxygen is relatively high, fresh water and chemicals are added to the system to reduce the concentration of minerals in the water and their deleterious effects. If the atmospheric conditions change so that the frequency of water replenishment is reduced, the minerals left behind in the water due to evaporation of the water will be reduced and the necessity of adding chemicals to the water will be reduced. Thus, the system functions to add chemicals to the water in response to the flow of makeup water to the system, which normally corresponds to the concentration of minerals in the water.

Thus, it is an object of this invention to provide a water treatment system for a water-cooled air-conditioning system which prolongs the life of the components of the system and reduces the frequency of inspection, maintenance and repair of the system.

Another object of this invention is to provide a cooling system that controls the composition of its cooling water to reduce the formation of scale, oxides, algae, bacteria, etc., on the surfaces of the system and in the water of the system.

Other objects, features and advantages of the present invention will become apparent upon reading the following specification when taken into conjunction with the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a schematic elevational view of a cooling tower and cooling system of a large capacity air-conditioning system.

FIG. 2 is an electrical schematic of the control system for the cooling system of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now in more detail to the drawing, in which like numerals indicate like parts throughout the several views, FIG. 1 illustrates water cooling tower **10**, fresh water inlet conduit **11**, flow switch **12**, and float-controlled valve **14** which controls the inlet of the water to the reservoir or sump **15** of the cooling tower. Cooling tower recirculating pump **16** functions to flow the water from sump **15** through the heat exchanger (not shown) of refrigeration unit **18** and to the spray conduit **19** in the upper portion of the cooling tower **10**. The water treating means includes bleed valve **20** controlled by solenoid **21**, and diaphragm injection pumps P1, P2 and P3 arranged to inject chemicals from supply sources **22,23** and **24**, respectively, into recirculating conduit **25** downstream from recirculating pump **16** and refrigeration unit **18**. Bleed valve **20** is positioned downstream from refrigeration unit **18** so that the hottest water of the system is discharged, and pumps P1, P2 and P3 are positioned downstream from bleed valve **20** so that the chemicals from these pumps will not be lost through the bleed valve and will be injected into the hottest water of the system where it is most effective.

As is illustrated in FIG. 2, when pump **16** is operating and float controlled valve **14** opens to flow fresh water through conduit **11** to sump **15**, flow switch **12** will detect the flow of water and will function to energize the system. When flow switch **12** is closed due to the flow of fresh water through conduit **11**, pumps P1 and P2 are energized through conductors **31** and **32**, and the water treating means or variable control mechanism **33** is energized through terminal conductors **34** and **35**. Solenoid **36** is immediately energized and functions to move the lever **38** of stepping switch **39**; however, the rotatable conductor arm **40** of stepping switch **39** will move only when solenoid **36** has been deenergized. Movable arm **40** of stepping switch **39** is connected through conductor **41** to conductor **34**. The odd-numbered contacts of the 12 contacts on stepping switch **39** are connected to the six contacts on selector switch SW1. The crescent conductor **42** of selector switch SW1 is arranged to progressively cover the contacts of the selector switch. The even-numbered contacts of stepping switch 39 are connected to the contacts of selector switch SW2, and its crescent conductor 44 is also arranged to make progressive contact of its contacts. With this arrangement, as rotatable arm 40 of stepping switch 39 rotates and sequentially engages its contacts, it will be alternately connected to selector switches SW1 and SW2.

When rotatable arm 40 of stepping switch 39 engages any one of its odd-numbered contacts, and if the crescent conductor 42 of selector switch SW1 is moved so that it engages all of its contacts, conductor 45 connected to contact numbered 1 of selector switch SW1 will be connected to the rotating conductor arm 40 on alternate positions of the conductor arm, which energizes relay R1 and makes a circuit to solenoid 21 to open bleeder valve 20. Thus, the sump 15 will be bled by bleeder valve 20 on alternate operations of float controlled valve 14. Of course, if the crescent conductor 42 of selector switch SW1 is repositioned so as to cover less than all of its contacts, the operation of bleeder valve 20 will be less frequent. For example, if crescent conductor 42 of selector switch SW1 is positioned as shown so as to cover the first three of its six contacts, bleeder valve 20 will function to operate on the first, third and sixth operation of float-controlled valve 14, and will not function again for the remaining cycles of operation of the float controlled valve until a total of 12 cycles of the float controlled valve has occurred. Thus, bleeder valve 20 will function during three of the 12 cycles of the float-controlled valve.

When rotatable contact arm 40 of stepping switch 39 engages the even-numbered contacts of the stepping switch, and if the crescent conductor 44 of selector switch SW2 is moved so that it engages all six of its contacts, solenoid 48 of stepping switch 49 will be energized through its conductors 50 and 51 on alternate positions of rotatable conductor arm 40 of stepping switch 30. This causes stepping switch 49 to move its rotatable conductor arm 52 on alternate cycles of float controlled valve 14. Of course, if the crescent conductor 44 of selector switch SW2 is in engagement with less than all of its contacts, the frequency of operation of solenoid 48 will be reduced. For instance, if crescent conductor 44 of selector switch SW2 is in engagement with five of its six contacts, solenoid 48 will be operated on the fourth, sixth, eight and 10th and 12th positions of rotatable conductor 40, but not on position numbered 2, so that solenoid 48 is operated only during five out of the 12 cycles of float-controlled valve 14.

Rotatable conductor arm 52 of stepping switch 49 is connected to terminal conductor 34 through its conductor 54, and its 12 contacts are connected to the 12 contacts of selector switch SW3. Thus, a circuit will be made to one of the contacts on selector switch SW3 for every position of rotatable conductor arm 52 of stepping switch 49. If the crescent conductor 55 of selector switch SW3 is in engagement with all of its 12 contacts, a circuit will be made to relay R2 through conductor 56 on every operation of float-controlled valve 14, and relay R2 will function to operate pump P3 during every cycle. Of course, if crescent conductor 55 of selector switch SW3 is in engagement with fewer than all of its contacts, pump P3 will be operated less frequently. For instance, if crescent conductor 55 is in engagement with the first four of its 12 contacts, pump P3 will operate when rotatable conductor arm 52 of stepping switch 49 is in engagement with its first four contacts. When the rotatable conductor arm 52 moves beyond the first four contacts, pump P3 will not be operated. Since rotatable conductor arm 52 moves only on alternate operations of float-controlled valve 14, pump P3 will then operate during the first eight cycles of float-controlled valve 14, and will be dormant during the next 16 cycles of the float controlled valve. With this arrangement, pump P3 will function to cause a surge of the chemical it injects into the water of the cooling tower, and then no more of its chemical will be injected for a prolonged time.

Pump P1 will normally be the pH control pump of the system and will function to inject sulfuric acid or a similar substance into the recirculating water. Pump P2 will be the corrosion inhibitor pump and will function to inject a chromate-base liquid into the recirculating water. Pump P3 is the algaecide pump and will function to inject an ammonium-based liquid into the recirculating water. It should be noted from FIG. 1 that bleed valve 20 is located upstream from pumps P1, P2 and P3, so that the water taken from the system is removed upstream from the location where the chemicals are injected into the system.

While pumps P1, P2 and P3 are schematically illustrated as being centrifugal pumps, it will be understood that these pumps are diaphragm pumps and function to inject accurate amounts of the chemicals into the system. Moreover, while the pumps are operating, pumps P1 and P2 function to inject approximately one-fourth the quantity of liquid into the recirculating water as pump P3, and all the pumps can be adjusted to control the quantity of liquid being pumped by controlling the amplitude of diaphragm movement and the timing of the pumping by adjustment of the variable control system 33.

Generally, Pump P3 will be set for less frequent operation than pumps P1 and P2, and since pump P3 functions to flow approximately four times the volume of liquid as pumps P1 and P2, the water treating means functions to inject a massive dose of algaecide at spaced time intervals. This arrangement is beneficial to the system in that algae occasionally becomes immune to an algaecide if it is in continuous contact with a constant dose of the algaecide. The massive infrequent dosage of algaecide tends to completely overcome any algae in the flow system on an infrequent basis, which is all that is necessary to control the algae under normal circumstances. Of course, switches SW2 and SW3 can be adjusted as may be suitable for the particular geographic and atmospheric conditions to increase or decrease the frequency of operation of Pump P3 as may be desired. In a similar manner, the frequency of operation of bleed valve 20 can be adjusted by changing the setting of switch SW1, as previously described.

Since the chemical compositions are added to the flow system as the water enters the upper end of the cooling tower, the surfaces of the cooling tower will be contacted with the chemical compositions and the chemicals will be sprayed with generally even distribution onto the top surface of the water in the reservoir. This keeps any blind spots from occurring in the system where the chemicals might not reach an area of the reservoir.

While this invention has been described in detail with particular reference to preferred embodiments thereof, it will be understood that variations and modifications can be effected within the spirit and scope of the invention as described hereinbefore and as defined in the appended claims.

I claim:

1. A flow system comprising a reservoir for water or the like, a heat exchange unit, spray means for spraying water to said reservoir, recirculating flow means for flowing recirculating water from said reservoir through said heat exchange unit and to said spray means, water makeup means responsive to the level of water in said reservoir for intermittently adding additional water to said reservoir, and water treating means responsive to the flow of water from said water makeup means to said reservoir and to the flow of recirculating water for treating the water flowing from said reservoir to said spray means, said water treating means including drain means for draining water from said flow system during less than all of the cycles of operation of said water makeup means.

2. The flow system of claim 1 and wherein said drain means comprises means for draining water from the water in said flow means downstream from said heat exchange unit and upstream from said spray means, and wherein said water treating means further comprises chemical additive means for adding a chemical composition to the water in said flow means downstream from the point in said flow means where the water is drained and upstream from said spray means.

3. The flow system of claim 1 and wherein said water treating means comprises chemical additive means selectively

responsive to at least some of the sequential cycles of intermittent addition of make up water by said water make up means for adding a chemical composition to the water of the flow system.

4. The flow system of claim 1 and wherein said drain means is selectively responsive to one-half or fewer of the cycles of intermittent addition of makeup water by said water makeup means for draining water from the water of the flow system, said water treating means further comprising first chemical additive means responsive to each of the cycles of intermittent addition of make up water by said water makeup means during the operation of said flow means for adding a chemical composition to the water of the flow system, and second chemical additive means selectively responsive to various cycles of the intermittent addition of makeup water by said water makeup means for adding a chemical composition to the water of the flow system.

5. A flow system comprising a reservoir for containing water or the like,

a heat exchange unit,

spray means arranged to spray water through a cooling tower to said reservoir,

flow means for flowing the water from said reservoir through said heat exchange unit to said spray means,

water makeup means responsive to the level of water in the said reservoir for flowing water or the like to said reservoir when the level of water in said reservoir is low and until the level of water in said reservoir reaches a predetermined level,

water drain means selectively responsive to one-half or fewer of the cycles of water flow through said water makeup means during the operation of said flow means for draining water flowing from said heat exchange unit to said spray means only during the flow of water by said water makeup means,

first chemical additive means responsive to each of the cycles of water flow through said water makeup means during the operation of said flow means for adding a chemical composition to the water flowing from said heat exchange unit to said spray means, and

second chemical additive means selectively responsive to all or fewer of the cycles of water flow through said water makeup means during the operation of said flow means for adding a chemical composition to the water flowing from said heat exchange unit to said spray means.

6. In a flow system comprising a cooling tower, a reservoir below the cooling tower, a heat exchange unit, and flow means connected between the reservoir, heat exchanger and cooling tower for recirculating water from the reservoir through the heat exchanger and to the cooling tower, and a water makeup means responsive to the level of water in said reservoir to flow makeup water to the reservoir, the improvement therein comprising water treating means operative only during the flow of water through the water makeup means for adding chemical compositions to the water being recirculated in said flow system during each cycle of operation of said water makeup means and for draining a portion of the recirculating water during less than each cycle of operation of said water makeup means.

7. The invention of claim 6 and wherein said water treating means comprises at least one pump means operative only during the flow of water through the water makeup means and during the flow of water through the flow means to add a chemical composition to the water flowing through the flow means.

8. The invention of claim 6 and wherein said water treatment means comprises at least two pump means selectively operative during various cycles of operation of the water makeup means to add chemical compositions to the water of the flow system.

9. A flow system comprising a reservoir for water or the like, a heat exchanger, spray means for spraying the water to said reservoir, recirculating flow means for flowing water from said reservoir through said heat exchanger and to said spray means, water makeup means responsive to the level of water in said reservoir for intermittently adding water to said system, water drain means responsive to selected cycles of said water makeup means for draining water from said system only during the flow of makeup water to said system, first chemical additive means for adding a first chemical composition to said flow system upon each cycle of said water makeup means and a second chemical additive means for adding a second chemical composition to said system at selected ones of the cycles of said water makeup means.

* * * * *

ATTACHMENT 22

US 20040134213A1

(19) United States

(12) Patent Application Publication (10) Pub. No.: US 2004/0134213 A1

Dudley et al. (43) Pub. Date: Jul. 15, 2004

(54) **AIR CONDITIONING CONDENSATION DRAINAGE SYSTEM**

(76) Inventors: **William E. Dudley**, Weimer, TX (US); **C. Ross Dutton**, Friendswood, TX (US)

Correspondence Address:
JAMES L. JACKSON
ANDREWS & KURTH, L.L.P.
SUITE 4200
600 TRAVIS
HOUSTON, TX 77002 (US)

(21) Appl. No.: **10/341,920**

(22) Filed: **Jan. 13, 2003**

Publication Classification

(51) **Int. Cl.**^{7} **F25D 23/12**; F25D 21/14

(52) **U.S. Cl.** **62/285**; 62/259.2

(57) **ABSTRACT**

An air-conditioning condensate drainage system for mounting to the roof membrane of the roof structure of buildings or for construction thereof directly onto the roof membrane of a building structure. The air-conditioning condensate drainage system is defined by one or more strips of material having an isolation membrane having a bottom surface for assembly to a roof membrane. A pair of spaced ridge elements project upwardly from the isolation membrane and cooperate with the isolation membrane to define an air-conditioning condensate drainage channel. In the alternative, ridge strips may be disposed in spaced relation and fixed directly to a roof membrane to define condensate drain channels along the roof membrane to in-roof drains. The condensate drain strip or ridge strips may be molded or extruded and maybe formed directly on and adhered to or fixed to the roof membrane to define the condensate drain channels.

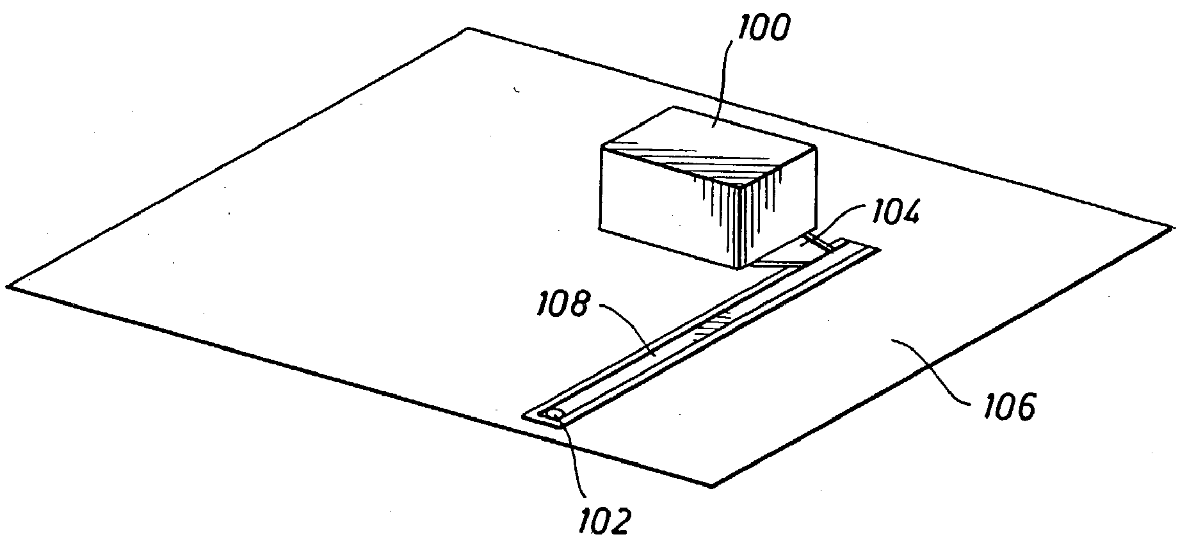


FIG. 1

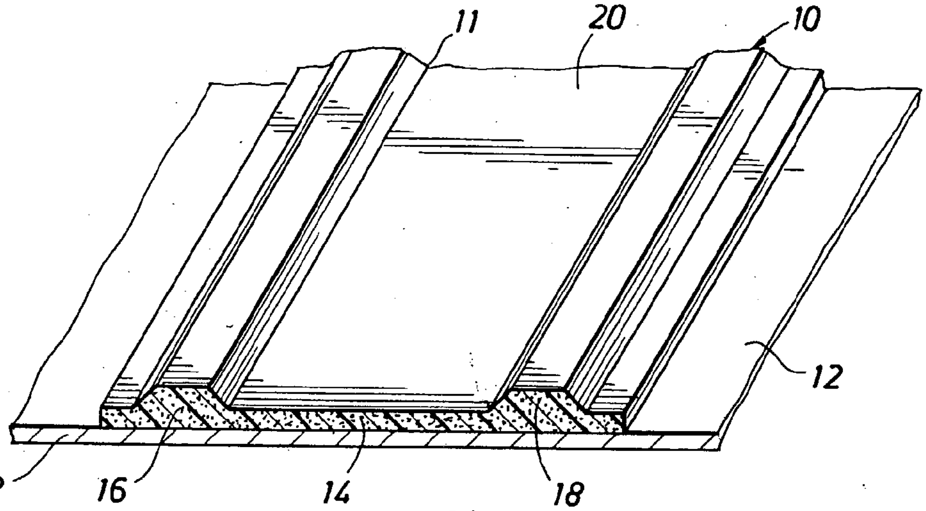
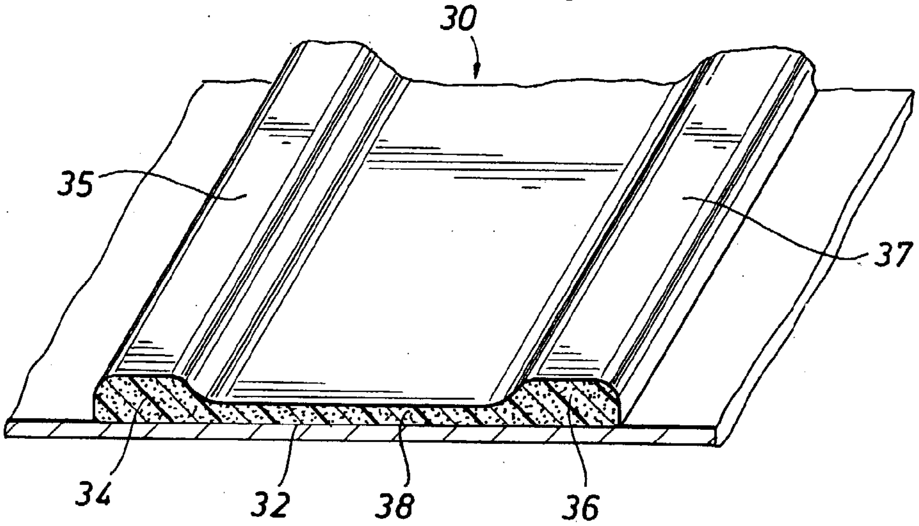


FIG. 2



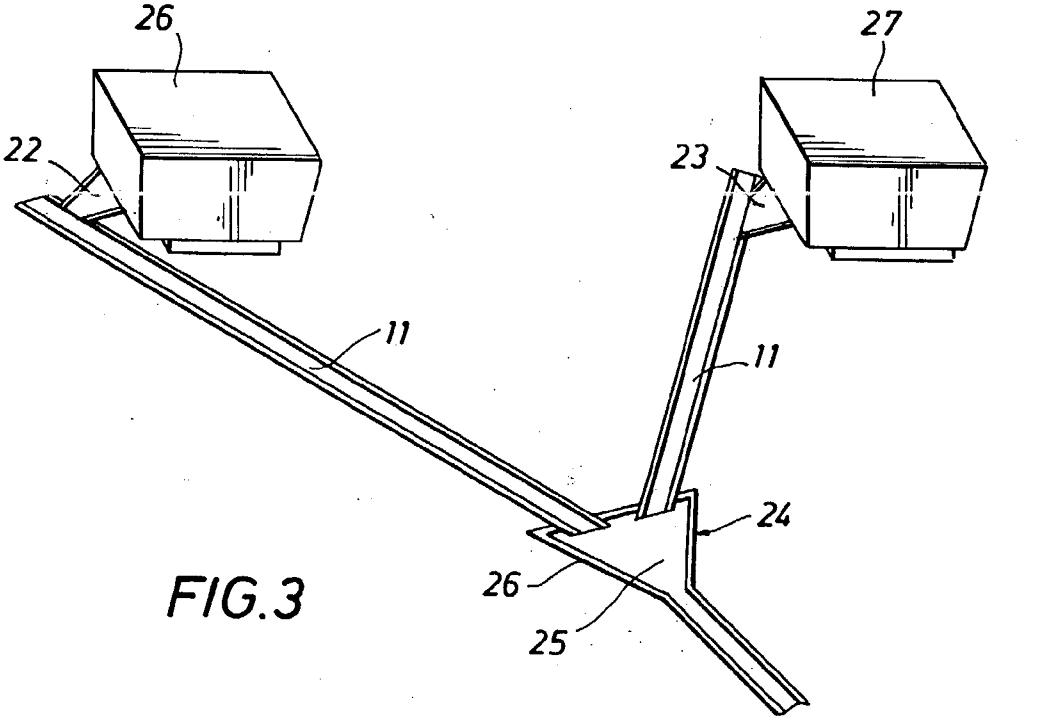


FIG. 3

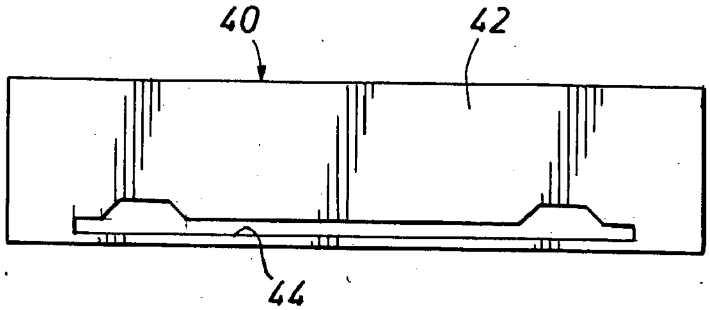


FIG. 4

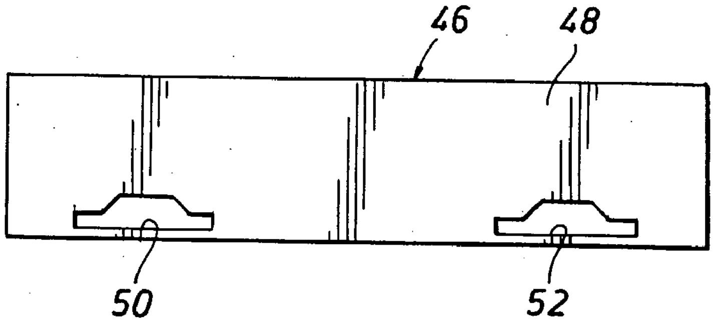
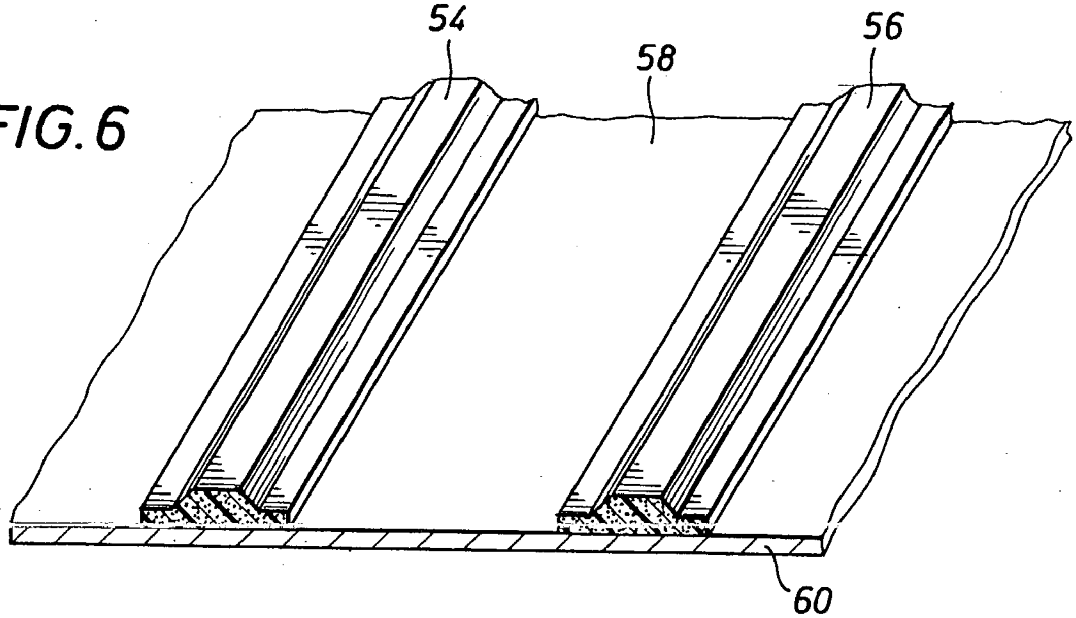


FIG. 5

FIG. 6



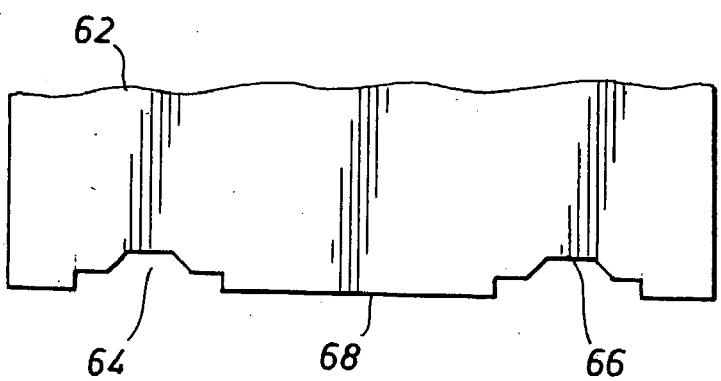


FIG. 7

FIG. 8

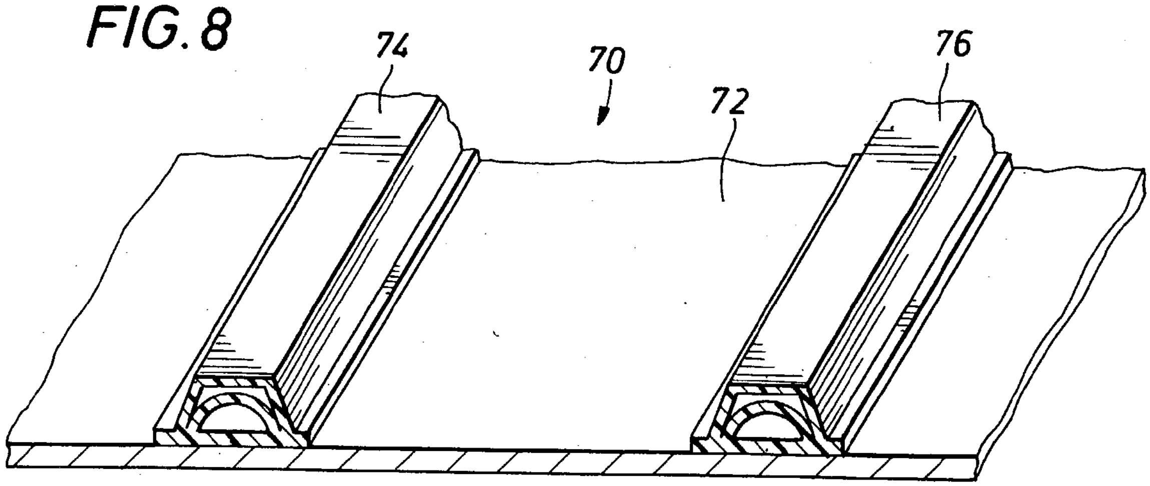
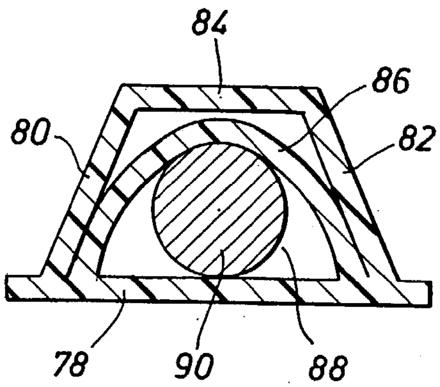


FIG. 9



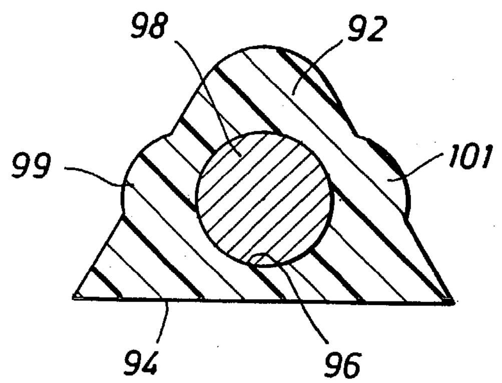


FIG. 10

FIG. 11

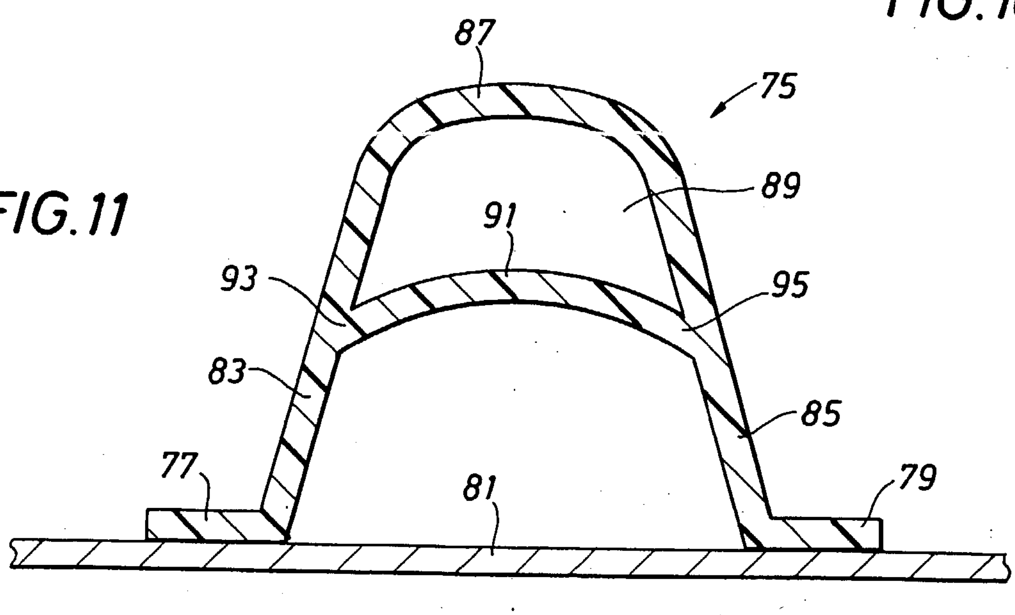


FIG. 12

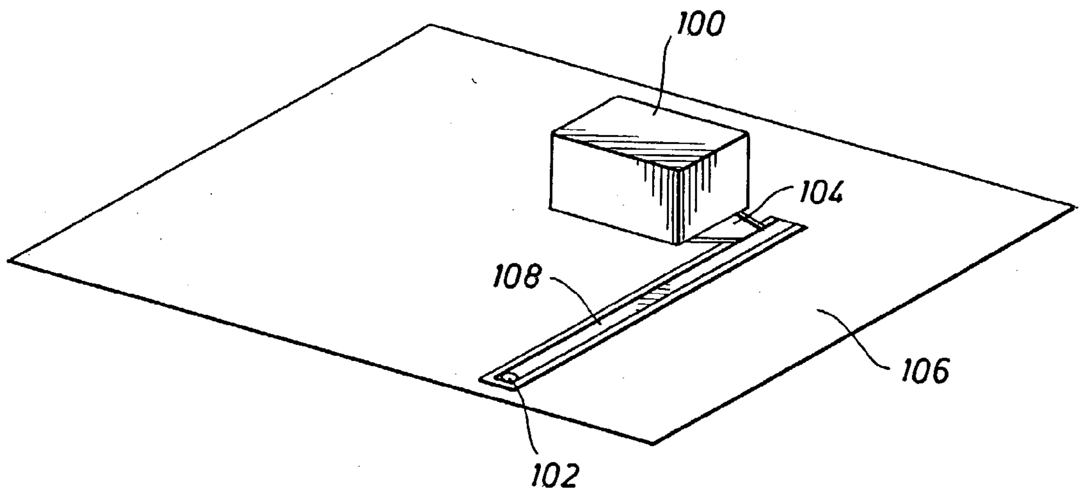
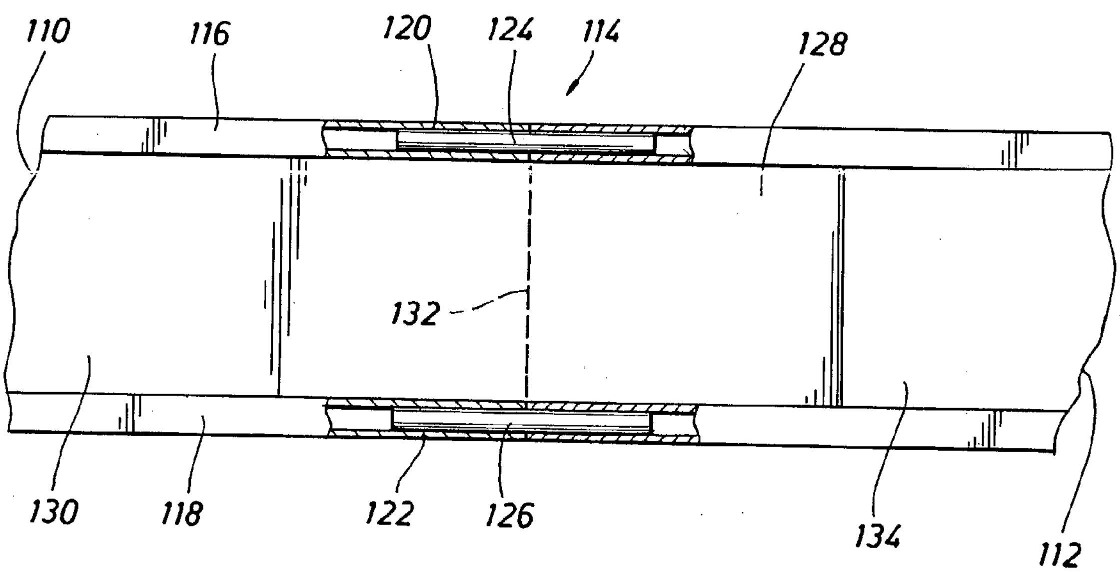

100
104
108
106
102

FIG. 13


110
116
120
124
114
128
132
130
118
122
126
134
112

AIR CONDITIONING CONDENSATION DRAINAGE SYSTEM

CROSS-REFERENCED TO RELATED PATENT

[0001] The present invention concerns an improvement to the subject matter of U.S. Pat. No. 6,167,717 for "Air Conditioning Condensation Drainage System", which issued to William E. Dudley and C. Ross Dutton on Jan. 2, 2001.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The present invention relates generally to the compromise or deterioration of roofing membrane materials by the condensate from air conditioning systems that are mounted on or above the roofs of commercial buildings that are finished with a roofing membrane that is slightly inclined or contoured, so as to direct water to drain openings in the roof and into drain conduits. More particularly, the present invention concerns the provision of a roof mounted drain system for collecting air conditioning condensate from roof-mounted air-conditioning units and conducting the condensate to a disposal drain and simultaneously isolating the roof membrane from contact by the air conditioning condensate. Even more specifically, the present invention concerns structure and materials for creating a plurality of nondestructive water conducting paths over the surface of a roofing system, that will direct discharged air conditioning condensate from roof mounted air conditioning units to one or more in-roof drains or gutters for disposal and will serve to isolate the roof membrane from the condensate.

[0004] 2. Description of the Prior Art

[0005] Roofing membrane deterioration is typically caused by the presence of persistent air conditioning ("a/c") condensation in localized areas on a roof surface, regardless of the roof surface membrane or construction. It has been determined through tests that a/c condensation moisture is laden with various chemical constituents and heavy metal concentration. Moreover, as water evaporation occurs and a/c condensation continues to be added onto the roofing membrane, the concentration of chemicals and heavy metals will continuously increase thus increasing the detrimental effect of these materials to the roofing membrane. Particularly, a/c condensation fluids attack the roof membrane in areas where it flows and in collection areas where it tends to collect in pools on the roof membrane surface. It has been found that summer heat will actually turn the water flows and pools into boiling water which will literally oxidize the roofing membrane. Extreme cold will freeze these water flows and pools causing fissures in the roof membrane surface. This problem is well documented by the National Roofing Contractors Association, manufacturers of roofing materials, and other roofing industry experts. Present methods of removing the a/c condensation from the roof surface are not effective. The following is a brief description of the most commonly utilized methods for a/c condensation removal from roofing systems.

[0006] PVC or Metal Piping:

[0007] The most common method utilized for the collecting and removal of a/c condensation from a roofing system is to connect a form of piping to the a/c unit and to run the piping from the unit to a suitable point of drainage. Typically, condensate collected in the condensate collection pan of a/c unit will exit the collection pan at a discharge opening and will flow into a drain line through a water trap, also referred to as a "P-trap". The P-trap is a U-shaped conduit section maintaining a water seal between the collection pan and the drain line which functions to isolate air within the drain line from the interior of the a/c unit. Debris and algae will build up or become deposited within the P-trap as well as the drain line and will block the flow of condensate discharge from the collection pan. When a/c condensate drainage piping is utilized, the different types of drainage piping will vary from polyvinyl chloride (PVC) piping, galvanized steel piping, copper piping, and even black iron gas line piping. It has been found with condensate drainage piping that the piping systems quickly become clogged with debris and algae that is present within the drainage system, especially when the a/c unit is situated in a humid environment. It is not unusual for P-traps and drain lines to require service three to four times per year to remove algae and debris blockage Obviously, when a/c drain conduits become clogged to the point that condensate water cannot flow freely there-through, the condensate will build up within the condensate collection pan until it flows into air flow ductwork and then seeks its way into the building. Service personnel are then called on an emergency basis to repair the roof sufficiently prevent leakage of water into the building. At times condensate will build up within the a/c unit until it begins to leak around the edges of the collection pan, in which case it will flow onto the roofing membrane, causing deterioration of the roof membrane as mentioned herein. If the a/c unit structure is partially rusted away adjacent the perimeter of the condensate collection pan, which is often the case, significant leakage of condensate onto the roofing membrane will occur. The condensate will then flow along the roof membrane, following the natural slope of the roof membrane and will develop one or more pools of condensate liquid on the roof surface. This condensate liquid, because it is laden with chemicals and heavy metals as mention above, will begin to degrade the roof membrane. As typically occurs in roofing systems, having condensate drain conduits, because of traffic, age, and constant clogging problems requiring significant maintenance effort and expense, personnel having the responsibility for building maintenance will eventually disconnect the condensate drainage pipes from the air conditioning units. This of course, will cause the a/c condensate to be discharged directly from the collection pan through the drain opening and onto the roof membrane surface. When the drain piping is disconnected in this manner, it is done with the knowledge that deterioration of the roofing membrane by the discharged a/c condensate will eventually result and that, as a consequence, roofing repair will be necessitated in a relatively short period of time. The eventual result is that the disconnected a/c drainage pipes will end up as debris that is present on the roof surface. This disconnected piping debris obviously presents a hazard to workers engaged in roofing maintenance and repair and can be a cause of damage to the roofing membrane.

[0008] Internal Piping:

[0009] While commercial buildings can be provided with internal a/c drain piping systems that extend throughout the building structure to conventional building drain lines, this internal piping method is seldom used because it is expensive and requires frequent maintenance. Internal condensate drainage piping is a piping system that is connected with the condensate discharge drains of the various a/c units and extends to plumbing drain lines within the confines of the building structure. Debris collected by the condensate of the a/c units will flow along with the condensate into the drain lines and in time will clog the lines. The algae that builds up in all a/c drain lines also causes clogging of the lines. In a relatively short time the drain lines will be sufficiently blocked that flow of condensate drainage will be blocked. This will cause the a/c condensate to enter duct-work and flow into the building structure as mentioned above. These systems are virtually always abandoned due to clogging because the drain lines, being located within the building structure are difficult to access and service or repair.

[0010] Surface Drainage:

[0011] Even though the presence of a/c condensate on a roof membrane is known to cause damage to the roofing system, surface drainage is the method that is most often employed for condensate drainage. Since drainage systems composed of metal or PVC pipe will become clogged and inoperative in a short period of time and are also expensive to install and maintain, it has been found most practical to allow roof surface drainage to occur, knowing that the roofing system will require repair at more frequent intervals. In this case, persistent a/c condensation fluids are allowed to collect in certain areas on the roof membrane surface, causing extensive and accelerated roof membrane deterioration. It is desirable therefore to provide an a/c condensate drainage system for flat roofed building structures which will not be subject to frequent blockage by debris, algae and the like and yet will continuously exclude a/c condensate drainage fluid from the roof membrane surface. It is also desirable to provide flat roofing systems of building structures with a/c condensate drain systems that will efficiently drain a/c condensate fluid along the roof surface to appropriate roof drains for disposal without permitting the a/c condensate to collect on the roof membrane.

[0012] Types of Roofing Systems:

[0013] The following types of roofing systems with roof mounted a/c units are specifically noted as roofing systems that would benefit from installation of an air conditioning condensation drainage system according to the present invention.

[0014] Single Ply Roofing Systems:

[0015] This type of roofing system includes all single ply systems such as ethylene propylene diene monomer or ethylene propylene diene terpolymer (EPDM), polyvinyl chloride (PVC), chlorosulfonated polyethylene (CSPE), also referred to by its registered trademark HYPALON®, thermoplastic olefin (TPO), and/or other types of single ply roofing membranes of chemically or heat welded seam systems.

[0016] Modified Bitumen Roofing Systems:

[0017] Modified bitumen roofing systems include all types of roofing systems that have a styrene butadiene styrene (SBS) or atactic polypropylene (APP) modified bitumen surface layer.

[0018] Built-Up Roofing Systems:

[0019] Built-up roofing (BUR) systems include all types of coal tar and asphalt built-up roofing systems that utilize felts or other fabrics as interply sheets that represent integral components of construction.

[0020] Metal Roofing Systems:

[0021] The term "metal roofing systems" is intended to encompass standing seam metal roofing, corrugated metal roofing and any other metal roofing that is applied in panels and having leakage preventing treatment at any panel joints that exist. The term "metal roofing systems" is also intended to encompass metal roofing installations having a metal roofing membrane and having ridge members which are attached to metal roofing by means of cement, bonding material or the like and which simulate standing seam metal roofing.

[0022] Other Roofing Systems:

[0023] The term "other roofing systems" is intended to encompass all other types of roofing systems that have a smooth surface of material or materials being exposed to weather and which define a roofing membrane that excludes water from the interior of a building structure.

SUMMARY OF THE INVENTION

[0024] It is a principal feature of the present invention to provide a novel a/c condensate drainage system for the roofing systems of buildings which provides for a/c condensate drainage along the contour of the surface of the roofing membrane and yet isolates most of the roofing membrane from continuous exposure to the condensate fluid and the chemical and heavy metal constituents contained therein;

[0025] It is another feature of the present invention to provide a novel a/c condensate drainage system for the roofing systems of buildings which can be provided in the form of one or more strip structures that are intended to be installed directly on the roof membrane surface of a roofing system to provide an open roof mounted surface drainage channel or closed drainage channel to conduct a/c condensate directly from an a/c unit to a roof mounted water drain of the roof structure;

[0026] It is an even further feature of the present invention to provide a novel a/c condensate drainage system for the roofing systems of buildings wherein the drainage system can be constructed of similar or identical roof membrane materials as compared to the roof membrane or can be of integral molded construction so that the surface mounted a/c condensate drainage system will be of sacrificial nature, being replaced as needed to permit the basic underlying roofing membrane to have a normal or conventional service life;

[0027] It is an even feature of the present invention to provide a novel a/c condensate drainage system for the roofing systems of buildings which is designed to capture air conditioning condensate and to channel the condensate along a non-destructive path over the surface of a roofing system and will direct the discharge condensation from roof mounted a/c units into an in-roof drain or gutter that is constructed from any of a number of existing roofing materials such as bitumen, rubber, CSPE, PVC, foam, TPO, asphaltic, HYPALON®, and/or any other common or uncommon materials used in the roofing industry; and

[0028] It is another feature of the present invention to provide a novel a/c condensate drainage system for the roofing systems of buildings which includes the use of pre-manufactured surface drainage system materials that are designed for installation onto a roof membrane to create a non destructive path over the surface of a roofing system and will direct the discharge condensation from roof mounted a/c units to an in-roof drain or gutter;

[0029] It is another feature of the present invention to provide a novel a/c condensate drainage system having a drain channel structure that is in the form of one or more strips of material which can be cemented, bonded or heat sealed to a conventional roofing membrane and can be molded and adhered to the roofing membrane or molded onto the roofing membrane to define one or more drainage channels for conducting air-conditioning condensate along a roof surface to one or more drains of the roof;

[0030] It is also a feature of the present invention to provide a novel a/c condensate drainage system for the roofing systems of buildings which is of integral construction, being formed in any desired manner, such as by molding or extrusion, including molding or extrusion of materials onto a roofing membrane to define air-conditioning condensate drainage channels or collector basins. The materials may be cured in place on the roofing membrane or bonded or cemented to the primary roofing membrane of a roof to create one or more water drain channels for draining a/c condensate or water from any other source to drain openings or gutters, while protecting the primary roofing membrane from accelerated deterioration by the substantially continuous presence of water, including air-conditioning condensate or its constituents.

[0031] It is another important feature of the present invention to provide a novel method and apparatus for installation of air-conditioning condensate drainage systems onto roof membrane surfaces, which include attachment of drainage channel forming materials to roof surfaces, molding of drainage channel structures directly onto roof surfaces and extrusion of drainage channel configurations from dies directly onto roof surfaces.

[0032] Briefly, the various objects and features of the present invention are realized through the provision of an a/c condensate drainage system having one or more strips of material that are secured in any desirable manner to a roof membrane surface for the purpose of defining a drainage channel along the roof surface for air-conditioning condensate emanating from roof mounted air-conditioning units, an isolation wall or membrane which is applied to a roof membrane surface by heat welding, bonding or by any other suitable means that is common to the roofing industry. This isolation wall or membrane can be a component of an integral or one-piece construction for an air-conditioning condensate drain element will be exposed to the weather and any a/c condensate that is present and will form the bottom surface of a roof mounted drain channel structure for conducting a/c condensate along the roof surface to an appropriate in-roof drain. One of the principal functions of this isolation membrane is to ensure that the a/c condensate does not come into contact with the roofing membrane over which it flows. A pair of lateral ridge structures project upwardly from the outer edge portions of the isolation membrane and are disposed in spaced relation so as to define a condensate channel there between. The lateral ridge structures can be integral with the isolation membrane, such as when integrally formed by a molding or extrusion process, and define spacing containment walls which are of sufficient height to efficiently drain a/c condensate along the drain channel without allowing it to overflow from the condensate drainage channel and spill onto the roof membrane surface. The lateral ridge structures may be composed of multiple layers of any suitable roofing material if desired. Alternatively, the lateral ridge structures may be formed by certain roofing materials such as asphaltic impregnated board, for example, which is fixed to the isolation membrane and which is then overlaid by one or more layers of roofing membrane material so that the condensate drain channel is defined largely by the upper layer of overlying roofing membrane material and the drain channel defined thereby. The a/c drain element, if desired, maybe formed onto the roofing membrane surface by an extrusion process which causes the a/c drain element to firmly adhere or become cemented or bonded to the roof membrane.

[0033] Under circumstances where an isolation membrane of a roofing installation is composed of a material that effectively resists deterioration by the chemical constituents of air-conditioning condensate, air-conditioning condensate drainage channels may be defined on the isolation membrane by adhering strips of ridge material in spaced relation onto the isolation membrane. Preferably these ridge strips will be of generally triangular configuration, having a reasonably large base surface for cementing or bonding to the isolation membrane and with inclined lateral surfaces converging in cross-section to a relatively narrow apex. The ends of the ridge strips, and perhaps the entire ridge strips will define central openings receiving joint alignment dowels that align abutting ends of the ridge strip material. Suitable adhesive or bonding material will typically secure the ends of the ridge strips in aligned abutting assembly. If desired, strips of air-conditioning condensate drainage channel material, having a central membrane and spaced channel forming ridges may have joint configurations that interfit and overlap to ensure against leakage, and the ridges may have end openings defining receptacles for ridge alignment dowels.

[0034] As a further alternative, an a/c drain channel may be formed on a roof membrane or on a drain channel membrane layer covering a roof membrane. In this case, strips of ridge defining material can be heat sealed, cemented, bonded or otherwise secured to the roof membrane or drain channel membrane layer and can be spaced as desired for defining a drain channel of desired width. Strips of ridge defining material of this nature can be applied to the roof membrane or a drain channel membrane in a manner defining one or more collector junctions or receptacles that are arranged to receive a/c condensate from two or more a/c drain channels to minimize the amount of drain channel material that might be required to effectively prepare a roofing system for a/c condensate drainage.

[0035] A polymer foam material may be extruded from an extrusion machine directly onto a roofing membrane and may be formed to a desired air-conditioning condensate drainage channel configuration such as by means of an extrusion die of the machine. Alternatively, the polymer form material emerging from an extrusion machine onto a roofing membrane surface can be rolled or otherwise formed in its uncured state, so as to cure to the desired configuration to define a drainage channel. After curing, an external lining of a suitable protective material may be sprayed onto or painted onto the polymer form to thus define a durable and impervious external lining for a drainage channel structure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0036] So that the manner in which the above recited features, advantages and objects of the present invention are attained and can be understood in detail, a more particular description of the invention, briefly summarized above, may be had by reference to the preferred embodiment thereof which is illustrated in the appended drawings, which drawings are incorporated as a part hereof.

[0037] It is to be noted however, that the appended drawings illustrate only a typical embodiment of this invention and are therefore not to be considered limiting of its scope, for the invention may admit to other equally effective embodiments.

[0038] In the Drawings:

[0039] **FIG. 1** is an isometric illustration of a part of an integrally constructed product strip representing an a/c condensate drainage system which is constructed in accordance with the principles of the present invention and is shown affixed to the roofing membrane of building structure;

[0040] **FIG. 2** is an isometric illustration of a part of an integrally constructed product strip representing an a/c condensate drainage system which is constructed in accordance with the principles of the present invention and which is molded or extruded onto a roof membrane surface or attached thereto in any suitable manner;

[0041] **FIG. 3** is an isometric illustration of a part of a roofing system and showing two roof mounted air-conditioning units and an air conditioning condensate drainage system which is constructed in accordance with the principles of the present invention and incorporates condensate collector basins having condensate drainage channels leading from the air-conditioning units to a channel drainage collector disposed in feeding relation with another drainage channel;

[0042] **FIG. 4** is an elevational view of a plate-type extrusion die for extruding an air-conditioning condensate drainage strip having the configuration shown in **FIG. 1**;

[0043] **FIG. 5** is an elevational view of a plate-type extrusion die for extruding a pair of spaced air-conditioning condensate drainage strips having the configuration shown in **FIG. 6** and which may be extruded for later attachment to a roof membrane or which may be directly extruded onto a roofing membrane;

[0044] **FIG. 6** is an isometric illustration showing a pair of condensate drainage control strips that may be extruded from the die of **FIG. 5** or might be formed in any other suitable fashion for attachment to a roofing membrane or extruded directly on a roofing membrane;

[0045] **FIG. 7** is an elevational illustration of a striker plate having a configuration for striking off excess extruded or laid foam material to define the spaced ridge element of an air-conditioning condensate drainage channel;

[0046] **FIG. 8** is an isometric illustration of a part of a roof membrane, having affixed thereto two spaced strips of a/c condensate drainage ridge material which is constructed in accordance with the principles of the present invention;

[0047] **FIG. 9** is a sectional view of a ridge strip construction for an air-conditioning condensate drainage channel or catch basin and having an internal structural wall and showing a joint alignment dowel member located within an opening defined in part by the internal structural wall;

[0048] **FIG. 10** is a sectional view of a ridge strip construction for an air-conditioning condensate drainage channel or catch basin and having an internal passage or opening having a joint alignment dowel member located therein for strip alignment at joints;

[0049] **FIG. 11** is a sectional view of a ridge strip element being similar to that of **FIG. 9** and being adapted for condensate drainage channel or catch basin construction on roofing installations;

[0050] **FIG. 12** is an isometric illustration showing a roof structure having an air-conditioning unit mounted thereon and showing a air-conditioning condensate drainage channel being defined by spaced ridge elements applied directly to the roof membrane or to a roof mounted panel defining a portion of a drain channel; and

[0051] **FIG. 13** is a plan view of joined strips of air-conditioning condensate drainage channel material, with parts thereof broken away and shown in section and illustrating dowelled interconnection and overlapping panel sections for joint integrity and joint leakage prevention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

[0052] Referring now to the drawings and first to **FIG. 1**, an air-conditioning condensate drainage system constructed in accordance with the principles of the present invention and representing the preferred embodiment is shown generally at **10** and is shown in the figure as a partial strip of condensate drain structure which is shown to be mounted in any suitable fashion onto the roofing membrane **12** of a building roofing system. The air-conditioning condensate drainage system **10** comprises an isolation membrane **14** which is typically in the form of an elongate strip of material that is compatible with the membrane material of the roofing membrane **12**. Preferably, the isolation membrane will be a component of an integral construction composed of a polymer material such as polyvinyl chloride (PVC) which may be layered with other suitable materials and may be reinforced by a suitable fabric to enhance the structural integrity thereof. The integral condensate drainage strip material **11** may be manufactured by an extrusion process either being a pre-manufactured strip component for attachment to a roofing membrane surface or, in the alternative, may be composed of a syntactic foam material which is extruded or molded directly onto the roofing membrane. The isolation membrane **14** may be constructed of identical or similar material as compared with the roofing membrane and will be affixed to the upper surface of the roofing membrane **12** by heat welding, bonding, by suitable roofing adhesive or by any other installation method or materials as is common to the roofing industry. The isolation membrane typically serves as the bottom membrane layer or one of the bottom layers of the a/c condensate drainage strip or strips and functions to isolate the roofing membrane **12** from contact by a/c condensate and the chemicals and heavy metals present therein and also functions to define the bottom wall structure of a drainage channel for conducting a/c condensate from the condensate discharge of an a/c unit to a suitable drain in the roofing structure. From the isolation membrane projects at least a pair of spaced ridge defining elements **16** and **18** which are preferably integral with the isolation membrane or web **14**. Additionally, the strip material **11** and its spaced ridge defining elements **16** and **18** may be composed of a heat weldable polymer material such as PVC which is heat welded to the roof membrane **12** and thus is a permanent integral component of the air-conditioning condensate drainage system. The spaced ridge defining elements are typically oriented in substantially parallel relation so as to define a condensate drain channel **20** therebetween. It should be borne in mind however, that the spaced ridge elements **16** and **18** may be oriented in angular relation to one another or oriented in any other suitable relation to define a drainage channel of desired configuration and dimension. For example, as is evident from **FIG. 3** hereof, the spaced ridge defining elements and the resulting ridges defined thereby can be oriented in diverging relation so as to define a catch basin **22** or **23** for collecting condensate being discharged by the condensate drain openings **24** of one or more a/c units, such as is shown at **26** and **27**. Typically, a catch basin **22** or **23** will be provided in the form of a pre-manufactured connector structure **23** which is affixed to the roofing membrane and is also affixed in suitable manner to a strip **11** of pre-manufactured condensate drain assembly. Alternatively, a catch basin structure **22** or **23** can be constructed in place on the roofing membrane so that its configuration can be suited to the a/c drain and the roof structure of the building. For conservation of materials, as shown in **FIG. 3**, condensate drain channels leading from air-conditioning units may conduct condensate to a collector basin structure shown generally at **24** which is preferably of generally triangular configuration, being defined by a collector membrane **25** having edge ridges **26**. The installed or pre-manufactured collector basin structure **24** may be of any suitable configuration and may be used for connection of drain channels, for defining catch basins, for connecting drain channels with roof mounted drain fittings, etc, without departing from the spirit and scope of the present invention. It should also be borne in mind that the spaced ridge defining elements **16** and **18** of the condensate drainage strips or the ridges **26** of the collector basins may be of any suitable dimension or configuration that may be considered appropriate for defining spaced ridges having a drain channel or basin therebetween. The spaced ridge defining elements may be of substantially triangular or rhomboid cross-sectional configuration as shown in **FIG. 1**, of oval or curved cross-sectional configuration as shown in **FIG. 2** if desired. In fact, the ridge defining elements may be of any configuration or dimension for defining spaced ridges projecting a suitable height above the isolation membrane or roof membrane surface to ensure that the maximum expected volume of a/c condensate and rain water or snow melt flow will be accommodated by the cross-sectional dimension and volumetric capacity of the drain channel. Additionally, since the roofing membranes of most commercial buildings are typically slightly sloped to enable surface drainage of the water resulting from rain, melting snow or ice to the in-roof surface drains of the roofing system, the spaced ridges of the condensate drain structure must be of sufficient height to compensate for the slight slope of the roofing membrane and yet provide for adequate containment of the a/c condensate that is intended to be acquired and controlled as it is conducted to a suitable in-roof drain for ultimate disposal. As an example, it should be noted that the ridge defining elements **16** and **18** may be of differing height if desired so that one drain channel ridge will have greater height than the other. This will allow the air-conditioning condensate drainage system to be mounted to a slightly sloping roof membrane in a manner accommodating its slope, and yet ensuring that the a/c condensate is adequately contained and is not permitted to spill over a ridge and onto the roofing membrane surface.

[0053] The embodiment shown generally at **30** in **FIG. 2** may be of molded or extruded construction and defines a substantially planar bottom surface **32** for contact with a roofing membrane surface. A pair of spaced contoured side ridges **34** and **36** are preferably formed integrally with the isolation membrane **38** thereof and define ridges having a curved or contoured upper surface as shown at **35** and **37**. The integral strip material of the embodiment **30** of **FIG. 2** may be formed by an extrusion or molding process for later attachment as a pre-manufactured strip to the roofing membrane of a roofing installation. In the alternative, if desired, the integral strip of material of the embodiment may be extruded directly onto the roofing membrane, with the material thereof being bonded or adhered to the roofing membrane surface.

[0054] Referring now to **FIGS. 4 and 5** of the drawings, extrusion dies are shown for extruding one of more strips of material either to form a pre-manufactured strip material for placement on the roof membrane of a roofing system or to extrude the strip material directly on the roof membrane surface. In the case of **FIG. 4**, an extrusion die shown generally at **40** is in the form of a die plate **42** having a single die opening **44** of the configuration for forming the condensate channel strip material of **FIG. 1**. In the case of **FIG. 5**, an extrusion die is shown generally at **46** which is in the form of a plate-like die **48** having a pair of extrusion openings **50** and **52** through which ridge strips, such as are shown at **54** and **56** in **FIG. 6** may be extruded. The extrusion openings **50** and **52** are spaced properly to define a condensate drain channel **58** of desired volumetric capacity therebetween. As shown in **FIG. 6**, the ridge strips **54** and **56** may be heat sealed, cemented or bonded to a conventional roof membrane **60** or may be extruded directly onto the roof membrane such as by a channel forming extrusion machine that is moved along the roof membrane during installation of the ridge strips. If desired, the extruded ridge strips may be coated with a protective material that resists damage by ultraviolet rays. Also, if desired, the channel ridge strips may be formed from a plurality of materials or a plurality of layers of material, such as conventional roofing materials, and adhered to the roof membrane by heat sealing, cementing, bonding or by any other suitable means of attachment.

[0055] The strip material forming the air-conditioning condensate drain strip or strips can be supplied in rolls so that rolls of extended length can be shipped to end users. In the alternative, the air-conditioning condensate drainage strip material can be cut into strips of suitable length, i.e., ten foot lengths, twenty foot lengths, etc. and can then be packaged for shipment to wholesalers, retailers or end users.

[0056] It should also be born in mind that the drain structure shown in FIGS. **1-6** may also be installed by constructing them directly on the roof structure through the use of any suitable construction procedure and materials that are appropriate to the roofing industry.

[**0057**] As shown in **FIG. 7**, extruded or laid foam material in its uncured state may be formed to desired configuration by a striker plate **62** having openings **64** and **66** that form the uncured foam material to define spaced ridges, with edge **68** defining a flat surface configuration during striking of the foam material. After the material has been formed and cured a coating of UV protective material may be applied to the cured foam substrate in any desirable manner.

[**0058**] As a further example, the air-conditioning condensate drainage system of FIGS. **1-3** can be installed in place on the roof membrane of a roofing system according to the following procedure: The isolation membrane **12** can be installed directly onto the roof membrane and suitably oriented to accommodate the slope of the roof membrane. The ridge defining structures of the strip material may then be placed in suitably spaced relation on the isolation membrane or directly on the roof membrane, so that the roof membrane becomes a portion of the condensate drain channel structure. The height of the ridge defining structures should be sufficient to accommodate unusually low areas of the roofing installation that occur due to roofing tolerances.

[**0059**] **FIGS. 1, 2** and **6** illustrate a/c condensate drainage strip materials of monolithic or integral construction and which may be formed by extrusion, molding or fabrication. These strip profiles maybe composed of polymer foam material PVC, Modified bitumens, Hypalons, CSPE, EPDM, and/or other suitable materials that are suitable for condensate drainage channels on roofing systems. In each case the profiles define spaced ridges and a bottom wall to confine a/c condensate and typically prevent its contact with the roof membrane to which the a/c condensate drainage system is affixed. If desired, however, ridge strips may be applied in any suitable manner to a roof membrane surface so as to use the membrane surface between the strips to form portions of the drain channels. The strip materials may be composed of any of a number of commercially available expandable foam materials which may be formed in place or may be premanufactured and then affixed to a roofing membrane by cementing, bonding or by any other suitable means. The condensate drainage strip material may be composed of any of a number of suitable materials having the capability for resisting damage in the presence of the heavy metal and chemical constituents of air-conditioning condensate.

[**0060**] The isometric illustration of **FIG. 8** shows an air-conditioning condensate drainage installation shown generally at **70**, having a central membrane **72** that may be the uppermost membrane of a roofing installation or may be an isolation membrane of the general nature shown at **14** in **FIG. 1**. Pre-manufactured ridge strips **74** and **76** are installed onto the membrane **72** in any suitable manner. The ridge strips **74** and **76** are each of the general configuration that is shown in **FIG. 9** and having a wide base wall **78** for attachment to the membrane and tapered side walls **80** and **82** extending in upwardly converging relation from the base wall. A generally flat top wall **84** is integral with the side walls. Within the hollow interior of the ridge strip is located a structural wall **86** that is shown to be of curved configuration and defines structural wall edges **87** and **89** that are either joined with the base wall **78** or with the side walls **80** and **82** or both. The structural wall **86** provides the hollow ridge strip with enhanced structural integrity and prevents its collapse. It should be borne in mind that the internal structural wall **86** may have a configuration other than the curved configuration that is shown. The curvature of the structural wall **86** and its relation with the base wall **78** defines an internal passage region **88** that permits the location of a dowel **90** within the internal passage. A dowel would be used at abutting joints of the ridge strip material to align the abutting strip ends, to facilitate connection of the ends of abutting strips and to provide the strip ends and the resulting joint with enhanced structural integrity. The dowel will extend into the passages of abutting ridge strips and permit the abutting ends of the ridge strips to be joined by cement or bonding material or to be heat welded or otherwise secured.

[**0061**] Another ridge strip embodiment is shown in **FIG. 10** and comprises a strip body **92** of generally triangular configuration, which defines a rather wide or broad base surface **94** that is adapted for being cemented, bonded or heat welded to a roof membrane or a drainage channel membrane. The ridge strip **92** defines inclined, upwardly converging side surfaces **93** and **95** which merge with a ridge top surface **97** which can be of arcuate cross-sectional configuration as shown or may be of substantially planar configuration, essentially as shown in **FIG. 9**. The ridge strip may be composed of any suitable polymer material or any of a number of acceptable roofing materials, such as indicated above. The ridge strip **92** defines a central passage **96** which receives a dowel member **98** in the same general manner as described in connection with **FIG. 9**. The dowel bridges the joint of abutting ridge strips, maintains alignment of the abutting ends of the ridge strips and enhances the capability of the ridge strips to be attached to one another to form a secure joint. The strip body structure may also be designed with opposed lateral rib elements **99** and **101** which provide a strengthening function for the strip as well as establishing an aesthetic appearance of the strip, when it is installed on a roofing membrane or on an isolation membrane to define a condensate drain channel.

[**0062**] In some cases the tolerances of roofing installations cause the slope of the roofing membrane to be uneven so that a roof surface condition exists that causes water "pooling" on the roofing membrane. When these pooling areas of a roof are traversed by the condensate drainage strips or panels of the present invention, water pooling within a drainage channel can occur. It is appropriate in such case, therefore, to provide condensate drainage channel installations having drainage channel ridges of greater height so that pooling condensate will not overflow the drainage channels and spill onto the roofing membrane of the roofing installation. As shown in **FIG. 11, a** ridge strip shown generally at **75** is of extruded construction, having base flanges **77** and **79** to enable the ridge strip to be affixed to any suitable surface. As shown, the base flanges **77** and **79** may be cemented, heat welded or bonded to a substrate **81**, which may be the bottom panel of a drainage channel strip or a section of a roofing membrane. Angulated side walls **83** and **85** are integral with the base flanges and extend upwardly therefrom and are disposed in upwardly converging relation with one another. The angulated side walls **83** and **85** merge smoothly with a curved upper wall structure **87** having an upwardly facing convex surface. The base flanges, angulated side walls and the curved upper wall structure cooperatively define an internal space **89**. An intermediate structural wall **91** is located intermediate the internal space **89** and is arranged with its opposite side edges **93** and **95** integrally connected intermediate the upper and lower edges of the respective angulated sidewalls. The intermediate structural wall **91** is of curved configuration and is oriented with its convex surface facing upwardly. This curved configuration of the intermediate structural wall **91** provides the ridge strip with considerable structural integrity and permits it to be of substantial height, to contain condensate as well as rainwater, snow melt, etc. on roofing areas that are subject to pooling. For example, the height of the curved upper wall **87** above the substrate **81** can be in the order of one inch or greater, if desired, and yet the ridge strip will have excellent characteristics of structural integrity. The ridge strip construction may be composed of any of a number of polymer materials, conventional roofing materials as desired, without departing from the spirit and scope of the present invention.

[**0063**] As shown in **FIG. 12**, the ridge strip material of FIGS. **8-10** can be used to define air-conditioning condensate drainage channels extending from a roof mounted air-conditioning unit **100** to a roof drain opening **102**. The ridge strip material can be arranged to define a catch basin **104** which receives all leaked condensate from the air-conditioning unit. The ridge strip material can be attached to the roof membrane **106** so as to define a drain channel **108**, with the spaced ridges confining the condensate to the drain channel and ensuring that no lateral leakage occurs as the condensate is conducted to the drain opening of the roof.

[**0064**] As shown in **FIG. 13**, pre-manufactured condensate drain channel strips shown at **110** and **112** can be constructed so as to establish an interfitting joint shown generally at **114**. In this case, the pre-manufactured drain channel strips each have side ridge elements **116** and **118** that are of tubular configuration or define dowel receptacles **120** and **122** at the ends, receiving dowel members **124** and **126**. The dowel members achieve alignment of the ends of the ridge members, enhance the structural integrity of the ridge members at the joint and simplify the attachment of the abutting ridge members. A portion **128** of the central panel **130** of the strip material **110** extends beyond the ends of the ridge members and overlaps the end **132** of the opposite air-conditioning condensate drainage strip **112**. The panel portion **128** is fixed to the central panel **134** of the strip material **112**, such as by cementing, bonding, heat sealing or the like and prevents leakage of the central panels at the joint **114**.

[**0065**] In view of the foregoing it is evident that the present invention is one well adapted to attain all of the objects and features hereinabove set forth, together with other objects and features which are inherent in the apparatus disclosed herein.

[**0066**] As will be readily apparent to those skilled in the art, the present invention may easily be produced in other specific forms without departing from its spirit or essential characteristics. The present embodiment is, therefore, to be considered as merely illustrative and not restrictive, the scope of the invention being indicated by the claims rather than the foregoing description, and all changes which come within the meaning and range of equivalence of the claims are therefore intended to be embraced therein.

We claim:

1. An air-conditioning condensate drainage system for the roof structure of buildings, comprising:

an elongate strip of material having an isolation membrane defining a bottom surface for assembly to a roof membrane and having an upper surface; and

a pair of ridges being integral with said elongate strip of material and being disposed in spaced relation with one another and cooperating with said isolation membrane to define an air-conditioning condensate drainage channel between said ridges.

2. The air-conditioning condensate drainage system of claim 1, comprising:

said pair of ridges each having a curved cross-sectional surface configuration.

3. The air-conditioning condensate drainage system of claim 1, comprising:

said pair of ridges each having a generally triangular cross-sectional surface configuration.

4. The air-conditioning condensate drainage system of claim 1? comprising:

said pair of ridges being disposed in angular relation with one another and defining a condensate collection basin therebetween; and

a plurality of condensate drain channels being in condensate feeding communication with said condensate collection basin.

5. An air-conditioning condensate drainage system for the roof structure of buildings, comprising:

a roof membrane defining a portion of a roofing system; and

a pair of spaced ridge elements being fixed to said roof membrane and being disposed in spaced relation with one another and defining an air-conditioning condensate drainage channel therebetween.

6. A method for manufacturing an air-conditioning condensate drainage system for the roof structure of buildings, comprising:

placing at least one elongate drain channel strip onto a roof membrane, said elongate drain channel strip being of integral construction and having an isolation membrane and having a pair of spaced ridge elements being integral therewith and defining an air-conditioning condensate drainage channel therebetween; and

fixing said elongate drain channel strip to said roof membrane.

7. The method of claim 6, comprising:

said fixing step being heat welding said elongate drain channel strip to said roof membrane; and

during said heat welding step, applying mechanical pressure to said elongate drain channel strip for enhancing said heat welding thereof to said roof membrane.

8. The method of claim 6, comprising:

said fixing step being forming said elongate drain channel strip directly on and in heat welded relation with said roof membrane.

9. The method of claim 8, comprising:

during said fixing step, extruding said elongate drain channel strip from an extrusion die directly on and in heat welded relation with said roof membrane.

10. The method of claim 6, comprising:

forming a pair of ridge strips on a roof membrane; and

heat welding said pair of ridge strips to said roof membrane.

11. The method of claim 10, comprising:

applying mechanical pressure to said pair of ridge strips for enhancing heat welding thereof to said roof membrane.

12. A method for installing an air-conditioning condensate drainage system on the roof structure of a building having one or more air-conditioning units, wherein the roof structure includes a roof membrane, said method comprising:

affixing a condensate collection basin to said roof membrane, said condensate collection basin having in isolation membrane and perimeter ridges of sufficient height to define a collection basin of sufficient volume to accommodate the condensate drainage from a plurality of air-conditioning units;

affixing elongate strips of condensate drain material to the roof membrane along a desired drainage path from a plurality of air-conditioning units to said condensate collection basin, said condensate drain material defining a pair of spaced ridges defining a drainage path therebetween; and

affixing an elongate strip of condensate drain material to the roof membrane along a desired drainage path from said condensate collection basin to an in-roof drain of the roof structure.

13. The method of claim 12, comprising:

said affixing said elongate strip of condensate drain material and said condensate collection basin to the roof membrane of the roof structure being heat welding.

14. The method of claim 13, comprising:

said affixing said elongate strip of condensate drain material and said condensate collection basin to the roof membrane including application of mechanical pressure to said elongate strip of condensate drain material and said condensate collection basin during heat welding thereof.

15. A method for manufacturing an air-conditioning condensate drainage system for application to a roof membrane of a roof structure of buildings, comprising:

positioning at least one elongate condensate drain strip on a roof membrane, said elongate condensate drain strip having a pair of spaced integral ridge elements thereon and defining a condensate drain channel therebetween; and

fixing said at least one elongate condensate drain strip to said roof membrane.

16. A method for installing an air-conditioning condensate drainage system for application to a roof membrane of a roof structure of buildings, comprising:

mixing a quantity of polymer foam material;

applying said polymer foam material to a roofing membrane; and

forming said polymer foam material to define an air-conditioning drain channel having spaced ridge members and defining a liquid drain channel between said spaced ridge members.

17. The method of claim 16, comprising:

after curing of said polymer foam material, applying a coating of protective material to said air-conditioning drain channel.

18. The method of claim 16, wherein said step of applying said polymer foam material to said roofing membrane comprising:

extruding said polymer foam material through a die plate having at least one die opening of a configuration defining at least a portion of said air-conditioning drain channel; and

depositing the extruded polymer foam material onto said roofing membrane.

19. The method of claim 16, wherein said step of applying said polymer foam material to said roofing membrane comprising:

depositing said polymer foam material onto said roofing membrane;

with said polymer foam material in its uncured state, forming said polymer foam material to a desired configuration to define an air-conditioning condensate drain channel structure; and

after said forming of said polymer foam material, permitting curing of said of said polymer foam material on said roofing membrane.

20. The method of claim 19, comprising:

said forming of said polymer foam material being extrusion of said polymer foam material through a die plate onto said roofing membrane.

21. The method of claim 19, comprising:

said forming of said polymer foam material being moving a striker plate along said polymer foam material, said striker plate being configured to conform said polymer foam material to desired configuration for defining an air-conditioning condensate drain channel structure.

22. An air-conditioning condensate drain channel structure, comprising:

at least one strip of material having a mounting base surface;

at least one elongate ridge member projecting upwardly from said mounting base surface;

and having upwardly converging side surfaces and an upper surface intersecting said side surfaces.

23. The air-conditioning condensate drain channel structure of claim 22, comprising:

said at least one strip of material being substantially solid and having a generally triangular cross-sectional configuration, having opposed angulated side surfaces extending upwardly from said base surface and being disposed in upwardly converging relation and merging with a ridge top surface.

24. The air-conditioning condensate drain channel structure of claim 22, comprising:

said at least one strip of material being of hollow construction defining an interior space and having a base wall and angulated side walls projecting upwardly from said base wall and being disposed in upwardly converging relation with one another, said at least one strip of material having a strip top wall being integral with each of said side walls; and

an intermediate structural wall being located within said interior space and having spaced bottom edges being in integral connection with at least said base wall, said intermediate structural wall providing said at least one strip of material with enhanced structural integrity.

25. The air-conditioning condensate drain channel structure of claim 24, comprising:

a dowel receptacle being defined between said intermediate structural wall and said base wall for receiving a dowel at a joint between abutting ridge strips for alignment of ridge strip ends for facilitating connection of abutting ridge strip ends and for enhancing the structural integrity of abutting connected ridge strips.

26. The air-conditioning condensate drain channel structure of claim 22, comprising:

said at least one strip of material being a pair of strips of material each defining at least one elongate ridge; and

said pair of elongate strips of material being mounted to a roofing membrane and disposed in spaced relation to define an air-conditioning condensate drain channel therebetween.

27. The air-conditioning condensate drain channel structure of claim 22, comprising:

said at least one strip of material having a central panel defining side edges and defining a pair of elongate ridge members each being located at a respective one of said side edges and defining an air-conditioning condensate drain channel therebetween; and

said at least one strip of material being adapted for mounted to a roofing membrane.

28. The air-conditioning condensate drain channel structure of claim 27, comprising:

said elongate ridges having ends defining dowel receptacles;

dowel elements being received with dowel receptacles of abutting elongate ridges for alignment of said ends of abutting ridges, for facilitating connection of said ends of abutting ridges and for enhancing the structural integrity of a joint defined by said ends of abutting ridges.

29. The air-conditioning condensate drain channel structure of claim 28, comprising:

a second strip of material being adapted for end to end connection with said at least one strip of material and having an extended central panel section being disposed for overlapping relation with a portion of said central panel of said at least one strip of material to prevent leakage at said joint.

30. An air-conditioning condensate drain channel strip comprising:

a drain channel ridge element having upwardly converging angulated side walls and an upper wall defining an internal ridge space;

at least one base flange being integrally connected with at least one of said angulated side walls and adapting said drain channel strip for mounting to a roofing substrate; and

an intermediate internal wall having side edges integrally connected with said angulated side walls and enhancing the structural integrity of said drain channel ridge element.

31. The air-conditioning condensate drain channel strip of claim 30, comprising:

said upper wall being elongate and being of curved configuration and having a convex surface facing upwardly; and

said intermediate internal wall being of curved configuration and having a convex surface facing upwardly.

32. The air-conditioning condensate drain channel strip of claim 30, comprising:

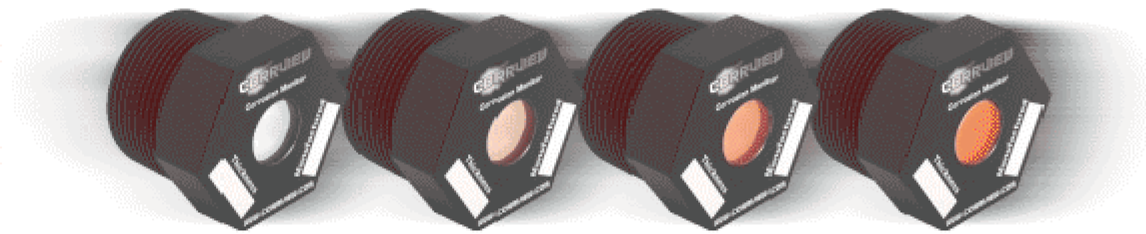
each of said upwardly converging angulated side walls having bottom edges; and

said at least one base flange being a pair of generally flat flange elements each projecting laterally and outwardly from respective bottom edges of said upwardly converging angulated side walls

* * * * *

ATTACHMENT 23

CORRVIEW



Technical Bulletin M-7

CHROMATE REMOVAL IN CLOSED HVAC RECIRCULATING SYSTEMS

The use of hexavalent chromium as a corrosion inhibitor of HVAC cooling and heating systems was finally prohibited for cooling tower use in New York City in January 1990, and elsewhere in the U.S. over some years prior.

For decades, chromate was the overwhelming treatment chemical of choice - providing low corrosion rates typically around 1 mil per year (MPY) for even open cooling tower systems, and controlling microbiological growths through its own inherent toxicity. Building and plant engineers relied solely upon the use of chromate based chemical additives to provide the required corrosion protection of steel piping systems. With even the most inferior application methods, often nothing more than an unmeasured scoop of chromate powder dumped into the cooling tower sump at irregular intervals, corrosion rates could often be maintained at or below 1 MPY.

Although its use in boilers and open cooling tower systems was almost totally banned, continued use in closed systems was permitted under stringent regulatory conditions - an option many building owners and plant operators have taken advantage of given the proven superior corrosion control provided by hexavalent chromate.

DRAINING REMAINS A PROBLEM

Removing hexavalent chromate from a closed circulating system prior to maintenance, drain down, or a change in chemical treatment program presents enormous problems since it is illegal to discharge chromate treated water into sewers, streams, rivers, or ground surfaces anywhere in the United States. State and federal regulations are quite strict.

Up until now, the only legal solution for those having older circulating systems treated with chromate has been to repeatedly drain and flush the entire volume into 55 gallon drums, and dispose of them as a hazardous waste in a sanitary landfill or through incineration - all at extraordinary cost.

Rather than remove thousands of gallons of chromate treated water and pay for the disposal of tens of thousands of pounds of hazardous waste material, it is possible to selectively filter the hexavalent chromate from any vessel or piping system.

SELECTIVE CHROMATE REMOVAL

Through a special procedure, the hexavalent chromate is adsorbed onto various specialty resin or ion exchange compounds - thereby reducing any toxic waste disposal problem ten thousand fold or more. In most cases, the problem can be reduced to the weight of just little more than the original chemical content itself.

At a typical concentration of 1,000 PPM for a closed system treated with hexavalent chromate, the actual amount of chemical is still only one tenth of one percent of the volume of the water - or 1/1,000 the weight of the water. A 5,000 gallon closed system, for example, would require the disposal of approximately 42,250 lbs. of chromate treated water on just the first draining - multiple drainings would be required to reduce the final chromate level to acceptable limits. Again for this example, 91 drums, 55 gallons each, would need to be filled and carted away just on the first drain down. As many as 300 drums might be ultimately required.

However, only about 42 lbs. of hexavalent chromate actually exists as the source of the problem, and can be slelectively removed by perhaps a few dozen ion exchange cartridges. This reduces the hazardardous waste problem dramatically - thereby also reducing handling and disposal costs. In addition, relatively few pounds of hazardous waste will not likely title a building or plant facility as a hazardous waste point source.

STEP BY STEP PROCEDURE

Preliminary testing of the water to identify its chemical characteristics and an estimate of the overall contaminant problem is recommended - since other factors, some of them hidden or unknown, can influence chromate removal efficiency.

This simple and inexpensive filtration system can be easily installed, setup and maintained by building personnel. Depending upon the volume of the system, the concentration of chromate to be removed, and the removal capacity of the particular type of filtering system selected, the chemical content can be reduced in as little time as a few days to a few months.

The chromate removal system typically consists of a series of five cartridge elements; each having the purpose of removing a specific component part of the chemical contaminant. Cartridges are individually housed to allow changing only those elements which have reached their maximum capacity - thereby reducing the cost of unnecessarily replacing partially used elements. For larger systems, refillable housing containing significantly more chromate removal resin can be used instead of the individual cartridges.

TOTAL REMOVAL

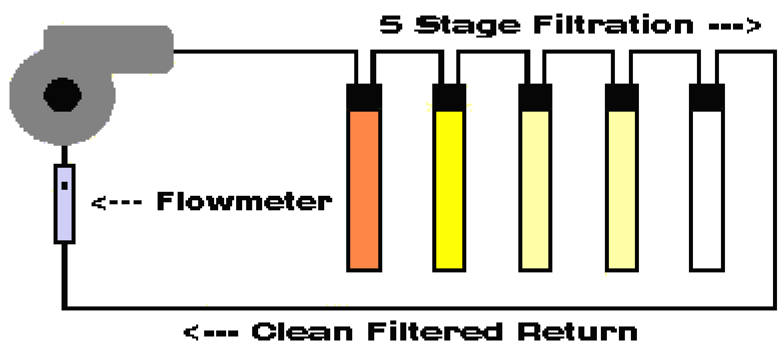
A flowmeter is incorporated into the piping layout in order to ensure the most effective chromate removal by maintaining the required retention time through the filtering media. When operated under design parameters, this chemical removal system will reduce chromate levels from 1,000 PPM or more to 0 PPM - thereby fulfilling all federal and/or state discharge requirements.

This chemical specific filtering system may be installed on a once through pass to a drain in order to satisfy a maximum allowed chemical discharge limit. Another option is to install it across one or more circulating pumps whereby the clear filtered water is returned to the system. After full completion of the chemical removal process, it is necessary to only dispose of the used cartridges by following recommended hazardous material procedures. Since the chromate is adsorbed onto resins which are contained within *"sealed"* plastic filter cartridges typically, worker exposure and site contamination is minimized.

Given knowledge of the total system volume, flow rate, contaminant concentration, and rate of cleaned fluid returned to the system, it is possible to calculate an estimate of the time required to clean any piping system down to any level of removal.

SIMPLE INSTALLATION

The below schematic flow diagram illustrates the basic mechanism for setting up an effective chromate removal system as described above. Other variations exist. Critically important is the need to prefilter the liquid using a fine 1-5 micron sediment cartridge in order to protect the microfine pores on the ion exchange resin from clogging - thereby limiting their removal capacity.



LPRSA0159793

ATTACHMENT 24

000044

Pabst Brewing Company

Newark, New Jersey

Underground Storage Tank Closure Summary Report

Prepared for:
Pearl Brewing Company,
San Antonio, Texas

ENSR Consulting and Engineering

March 1992

Document Number 9500-141-004

FNC000215

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Date Rec'd ______
TMS # ______
Staff ______

DIVISION OF WATER RESOURCES
BUREAU OF UNDERGROUND STORAGE TANKS
TANK MANAGEMENT SECTION

CN 029, 401 EAST STATE STREET
TRENTON, N.J. 08625-0029

UNDERGROUND STORAGE TANK SITE ASSESSMENT SUMMARY

Under the provisions of the Underground Storage of Hazardous Substances Act In accordance with N.J.A.C. 7:14B

This Summary form shall be used by all owners and operators of Underground Storage Tank Systems (USTS) who have either reported a release and are subject to the site assessment requirements of N.J.A.C. 7:14B-8.2 or who have closed USTS pursuant to N.J.A.C. 7:14B-9.1 et seq and are subject to the site assessment requirements of N.J.A.C. 7:14B-9.2 and 9.3.

INSTRUCTIONS

- *Please print legibly or type*
- *Fill in all applicable blanks. This form will require various attachments in order to complete the Summary. The technical guidance document Interim Closure Requirements for USTs explains the regulatory (and technical) requirements for closure and the Scope of Work Investigation and Corrective Action Requirements for Discharges from Underground Storage Tanks and Piping Systems explains the regulatory (and technical) requirements for corrective action.*
- *Return one original of the form and all required attachments to the above address*
- *Attach a scaled site diagram of the subject facility which shows the information specified in Item IV B of this form*
- *Explain any "No" or "N/A" response on a separate sheet.*

Date of Submission ______

0161255
FACILITY REGISTRATION #

I. FACILITY NAME AND ADDRESS

Pabst Brewing Company
400 Grove Street
Neward, N.J. 07106 County Essex
Telephone No. (512) 226-0231

OWNER'S NAME AND ADDRESS, if different from above

Pearl Brewing Company
312 Pearl Parkway
San Antonio, Texas 78215
Telephone No. (512) 226-0231

FNC000216

II. DISCHARGE REPORTING REQUIREMENTS

A. Was contamination found? X Yes ___ No If Yes, Case No 91-11-27-1214-05
(Note All discharges must be reported to the Environmental Action Hotline (609) 292-7172)

B. The substance(s) discharged was(were) Petroleum Hydrocarbons

C. Have any vapor hazards been mitigated? X Yes ___ No ___ N/A

III. DECOMMISSIONING OF TANK SYSTEMS

Closure Approval No. C-91-1875 C-91-2898 C-91-2899 C-91-4340 C-91-4341 C-91-2900

The site assessment requirements associated with tank decommissioning are explained in the Technical Guidance Document, Interim Closure Requirements for UST's, Section V. A-D. Attach complete documentation of the methods used and the results obtained for each of the steps of tank decommissioning used. Please include a site map which shows the locations of all samples and borings, the location of all tanks and piping runs at the facility at the beginning of the tank closure operation and annotated to differentiate the status of all tanks and piping (e.g., removed, abandoned, temporarily closed, etc.). The same site map can be used to document other parts of the site assessment requirements, if it is properly and legibly annotated.

IV. SITE ASSESSMENT REQUIREMENTS

A. Excavated Soil

Any evidence of contamination in excavated soil will require that the soil be classified as either Hazardous Waste or Non-Hazardous Waste. Please include all required documentation of compliance with the requirements for handling contaminated excavated soil (if any was present) as explained in the technical guidance documents for closure and corrective action. Describe amount of soil removed, its classification and disposal location.

B. Scaled Site Diagrams

1. Scaled site diagrams must be attached which include the following information:

a. North arrow and scale
b. The locations of the ground water monitoring wells
c. Location and depth of each soil sample and boring
d. All major surface and sub-surface structures and utilities
e. Approximate property boundaries
f. All existing or closed underground storage tank systems, including appurtenant piping
g. A cross-sectional view indicating depth of tank, stratigraphy and location of water table
h. Locations of surface water bodies

C. Soil samples and borings (check appropriate answer)

1. Were soil samples taken from the excavation as prescribed? X Yes ___ No ___ N/A

2. Were soil borings taken at the tank system closure site as prescribed? X Yes ___ No ___ N/A

3. Attach the analytical results in tabular form and include the following information about each sample
a. Customer sample number (keyed to the site map)
b. The depth of the soil sample
c. Soil boring logs
d. Method detection limit of the method used
e. QA/QC Information as required

D. Ground Water Monitoring

1. Number of ground water monitoring wells installed __2__

2. Attach the analytical results of the ground water samples in tabular form. Include the following information for each sample from each well:

   a. Site diagram number for each well installed
   b. Depth of ground water surface
   c. Depth of screened interval
   d. Method detection limit of the method used
   e. Well logs
   f. Well permit numbers
   g. QA/QC information as required

V. SOIL CONTAMINATION

A. Was soil contamination found? _X_ Yes ___ No
If "Yes", please answer Question B-E
If "No", please answer Question B

B. The highest soil contamination still remaining in the ground has been determined to be:
1. _791000__ ppb total BTEX, _3185000__ ppb total non-targeted VOC
2. _21391__ ppb total B/N, _22520__ ppb total non-targeted B/N
3. _7430__ ppm TPHC
4. _12000__ ppb __ LEAD __ (for non-petroleum substance)

C. Remediation of free product contaminated soils

1. All free product contaminated soil on the property boundaries and above the water table are believed to have been removed from the subsurface _X_ Yes ___ No
2. Free product contaminated soils are suspected to exist below the water table ___ Yes _X_ No
3. Free product contaminated soils are suspected to exist off the property boundaries. ___ Yes _X_ No

D. Was the vertical and horizontal extent of contamination determined? ___ Yes _XX_ No ___ N/A

E. Does soil contamination intersect ground water? _X_ Yes ___ No ___ N/A

VI. GROUND WATER CONTAMINATION

A. Was ground water contamination found? _X_ Yes ___ No
If "Yes", please answer Questions B-G.
If "No", please answer only Question B.

B. The highest ground water contamination at any 1 sampling location and at any 1 sampling event to date has been determined to be:

1. _38800__ ppb total BTEX, _15200__ ppb total non-targeted VOC
2. ____ ppb total B/N, ____ ppb total non-targeted B/N
3. _100__ ppb total MTBE, _1500__ ppb total TBA
4. ____ ppb ____ (for non-petroleum substance)
5. greatest thickness of separate phase product found _None__
6. separate phase product has been delineated ___ Yes ___ No _XX_ N/A

C. Result(s) of well search

1. A well search (including a review of manual well records) indicates that private, municipal or commercial wells do exist within the distances specified in the Scope of Work. ___ Yes ___ No _XX_ N/A

2. The number of these wells identified is _____ .

"s and contaminant plume

1. The shallowest depth of any well noted in the well search which may be in the horizontal or vertical potential path(s) of the contaminant plume(s) is _______ feet below grade (consideration has been given for the effects of pumping, subsurface structures, etc. on the direction(s) of contaminant migration). This well is _______ feet from the source and its screening begins at a depth of _______ feet.

2. The shallowest depth to the top of the well screen for any well in the potential path of the plume(s) (as described in D1 above) is ________ feet below grade. This well is located ________ feet from the source

3. The closest horizontal distance of a private, commercial or municipal well in the potential path of the plume (as determined in D1) is ________ feet from the source. This well is ________ feet deep and screening begins at a depth of ________ feet.

E. A plan for separate phase product recovery has been included. ___ Yes ___ No XX N/A

F. A ground water contour map has been submitted which includes the ground water elevations for each well
___ Yes ___ No XX N/A

G. Delineation of contamination

1. The ground water contaminants have been delineated to MCLs or lower values at the property boundaries. ___ Yes XX No

2. The plume is suspected to continue off the property at concentrations greater than MCLs.
XX Yes ___ No

3. Off property access (circle one): is being sought has been approved has been denied

VII SITE ASSESSMENT CERTIFICATION [preparer of site assessment plan - N.J.A.C. 7:14B-8.3(b) & 9.5(a)3]

The person signing this certification as the "Qualified Ground Water Consultant" (as defined in N.J.A.C. 7:14B-1.6, responsible for the design and implementation of the site assessment plan as specified in N.J.A.C. 7:14B-8.3(a) & 9.2(b)2, must supply the name of the certifying organization and certification number.

"I certify under penalty of law that the information provided in this document is true, accurate, and complete and was obtained by procedures in compliance with N.J.A.C. 7:14B-8 and 9. I am aware that there are significant penalties for submitting false, inaccurate, or incomplete information, including fines and/or imprisonment."

NAME (Print or Type) STEVEN CROCE SIGNATURE Steven A. Croce

COMPANY NAME ENSR Cons. + Engr. DATE March 9, 1992
(Preparer of Site Assessment Plan)

CERTIFYING ORGANIZATION N.J. Board of Professional Engineers

CERTIFICATION NUMBER 27608

US-014
2/91

VIII. TANK DECOMMISSIONING CERTIFICATION (person performing tank decommissioning portion of closure plan - N.J.A.C. 7:14B-9.5(a)4)

"I certify under penalty of law that tank decommissioning activities were performed in compliance with N.J.A.C. 7:14B-9.2(b)3. I am aware that there are significant penalties for submitting false, inaccurate, or incomplete information, including fines and/or imprisonment."

NAME (Print or Type) BRIAN D RADUS SIGNATURE Brian D Radus

COMPANY NAME ENSR R&C DATE 3/10/92
(Performer of Tank Decommissioning)

IX. CERTIFICATIONS BY THE RESPONSIBLE PARTY(IES) OF THE FACILITY

A. The following certification shall be signed by the highest ranking individual with overall responsibility for that facility [N.J.A.C. 7:14B-2.3(c)1].

"I certify under penalty of law that the information provided in this document is true, accurate, and complete. I am aware that there are significant penalties for submitting false, inaccurate, or incomplete information, including fines and/or imprisonment."

NAME (Print or Type) ______________ SIGNATURE ______________

COMPANY NAME ______________ DATE ______________

B. The following certification shall be signed as follows [according to the requirements of N.J.A.C. 7:14B-2.3(C)2]:

1. For a corporation, by a principal executive officer of at least the level of vice president
2. For a partnership or sole proprietorship, by a general partner or the proprietor, respectively; or
3. For a municipality, State, Federal or other public agency by either the principal executive officer or ranking elected official.
4. In cases where the highest ranking corporate partnership, governmental officer or official at the facility as required in A above is the same person as the official required to certify in B, only the certification in A need to be made. In all other cases, the certifications of A and B shall be made.

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false, inaccurate, or incomplete information, including fines and/or imprisonment."

NAME (Print or Type) ______________ SIGNATURE ______________

COMPANY NAME ______________ DATE ______________

FNC000220

Attachment 1

Explanations of "No" or "NA" response to Underground Storage Tank
Site Assessment Summary

Question Number			
V.	C.	2.	Free product contaminated soils were either removed during soil excavation or removed during tank decommissioning. Refer to closure summary report section 3.0 and analytical test result tables 3-1 through 3-9.
		3.	Refer to tables 3-1 through 3-9 of Closure Summary Report. Analytical results suggest free-product is not present in soils off-site.
VI.	C.	1.	A well search investigation was not conducted under the UST Closure Plan scope of work.
	E.		No separate phase product were detected in groundwater monitoring wells, MW-1 Tank E8; or MW-3A, tank E7. Refer to section 3.0 of Closure Summary Report.
	F.		A groundwater elevation survey or contour map were not included in the Closure Plan scope of work.
	G.	1.	Ground water analysis performed at MW-1 and MW-3A indicated valves above MCLS. Groundwater flow direction and gradient determination were not included in the Closure Plan scope of work.
	G.	3.	Offsite property access has not been sought under the Closure Plan scope of work.

1.0 INTRODUCTION

ENSR Remediation and Construction (ENSR) was contracted by Pearl Brewing Company to prepare the necessary plans and documentation to perform underground storage tank (UST) closure activities in accordance with NJAC 7:14B-9. Upon approval of these plans by the New Jersey Department of Environmental Protection (NJDEP)/Bureau of Underground Storage Tanks (BUST), ENSR under took the appropriate construction activities to close-in place and remove and dispose of underground tank systems, and perform site assessments.

This report has been prepared to document the tank closure activities and findings from the site assessments performed at each tank location. In accordance with NJAC 7:14B-9.5, the record keeping, testing data, and tank diagrams associated with each site assessment are to be reported to the NJDEP/BUST within 120 days of the closure completion.

The closure plan was developed and approved in accordance with the NJDEP Technical Guidance Document, "Interim Closure Requirements for Underground Storage Tank Systems", September 1990, and is consistent with the American Petroleum Institute manuals of practice.

A Closure Application and Closure Plan for Pabst Brewing Company was submitted to the NJDEP BUST in May, 1991 and approved August 15, 1991. The following approval numbers were granted:

UST Number: 0161255

Approval Numbers:

Tank E1-4	C-91-1875
Tank E5	C-91-4340 (revised November)
Tank E6	C-91-2898
Tank E7	C-91-2899
Tank E8	C-91-2900
Tank E9	C-91-4341 (added November)

The original Closure Plan was revised through submissions made November 26, 1991, in a letter to Mr. Doug Berry, Project Coordinator, NJDEP BUST. Revisions were required based upon field conditions encountered while performing closure activities. One additional tank was discovered while drilling soil borings around Tank E5. The revised plans requested approval to abandon-in-place Tank E5 and new Tank E9. Also, clarification was made to identify Tank E7 as two (2) 2000 gallon steel tanks instead of one 4000 gallon tank as registered.

On November 27, 1991, ENSR contacted the NJDEP "Hotline" to report high soil concentrations of TPH at Tank E5, and high concentrations of volatile organics at Tank E8 and E7. The NJDEP Case Number assigned is #91-11-27-1214-05.

On December 23, 1991 closure approval was received for the revised closure application on Tank E5 and E9.

2.0 PROJECT DESCRIPTION

The site location and history is described in this section along with a detailed a description of the underground storage tanks (UST) involved in the closure activities.

2.1 Site Location and History

The Pabst Brewing Company facility is located in the City of Newark, Essex County, New Jersey. Refer to Figure 2-1. The facility was closed in 1985 which was likely in conjunction with the purchase of the facility by Pearl Brewing Company, headquartered in San Antonio, Texas. Due to lack of information on the facility background, the history of past ownership and operations cannot be reported. Now, due to current state of New Jersey requirements (NJAC 7:14B-1-13 and 15) for the registration and permitted operations of underground storage tanks, the current owner decided to decommission tanks that were formerly used to store petroleum products.

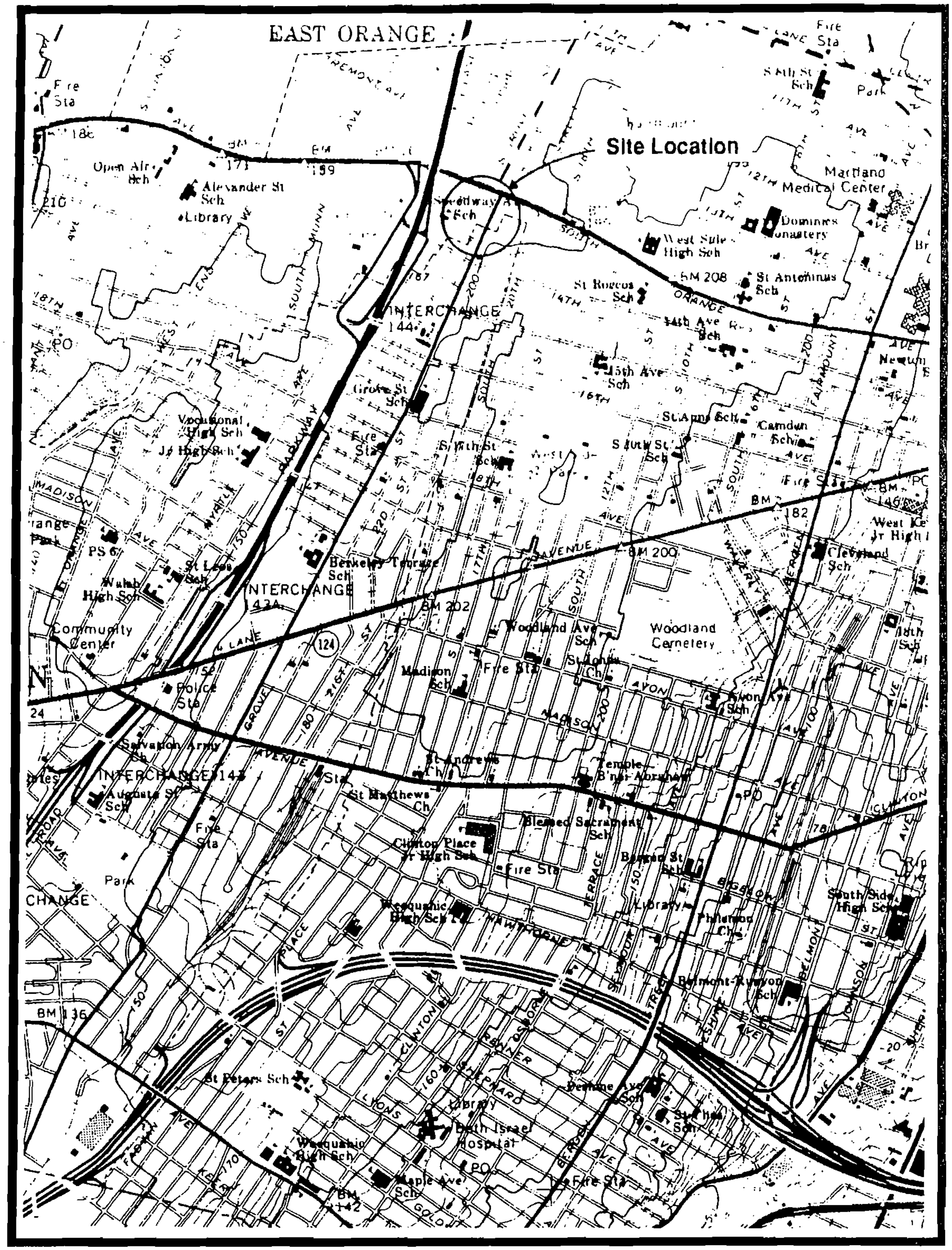
The Pabst Brewing Company site is located in heavily commercialized Newark, New Jersey. The facility consists of buildings and parking lots which occupy the area bordered by South Orange and Dassing Avenues between Whitney and South 21 st. Street. The buildings are constructed of a combination of brick and steel. The underground storage tanks E1-E9 were located in either parking lots or beneath sidewalks in close proximity to buildings and streets. The close proximity of the UST's to the streets and buildings made for difficulties in the operations of heavy equipment and tank removals.

Due to the limited amount of UST installation and use documentation, the exact location, size, and product storage for some tanks were modified based on actual conditions experienced during the closure activities.

2.2 UST Descriptions

Nine (9) underground storage tanks (UST) were used by Pabst Brewing Company for storage of fuels and heating oils. The actual locations of these nine tanks are indicated on Figure 2-2.

Tanks E1 through E4 were 25,000 gallon steel tanks used to store #6 heating oil for use in the boiler house in building #9. Their location is lot "D" which is an open area near the loading docks for building #14. The location is a fenced area with concrete pads and fencing at the surface.



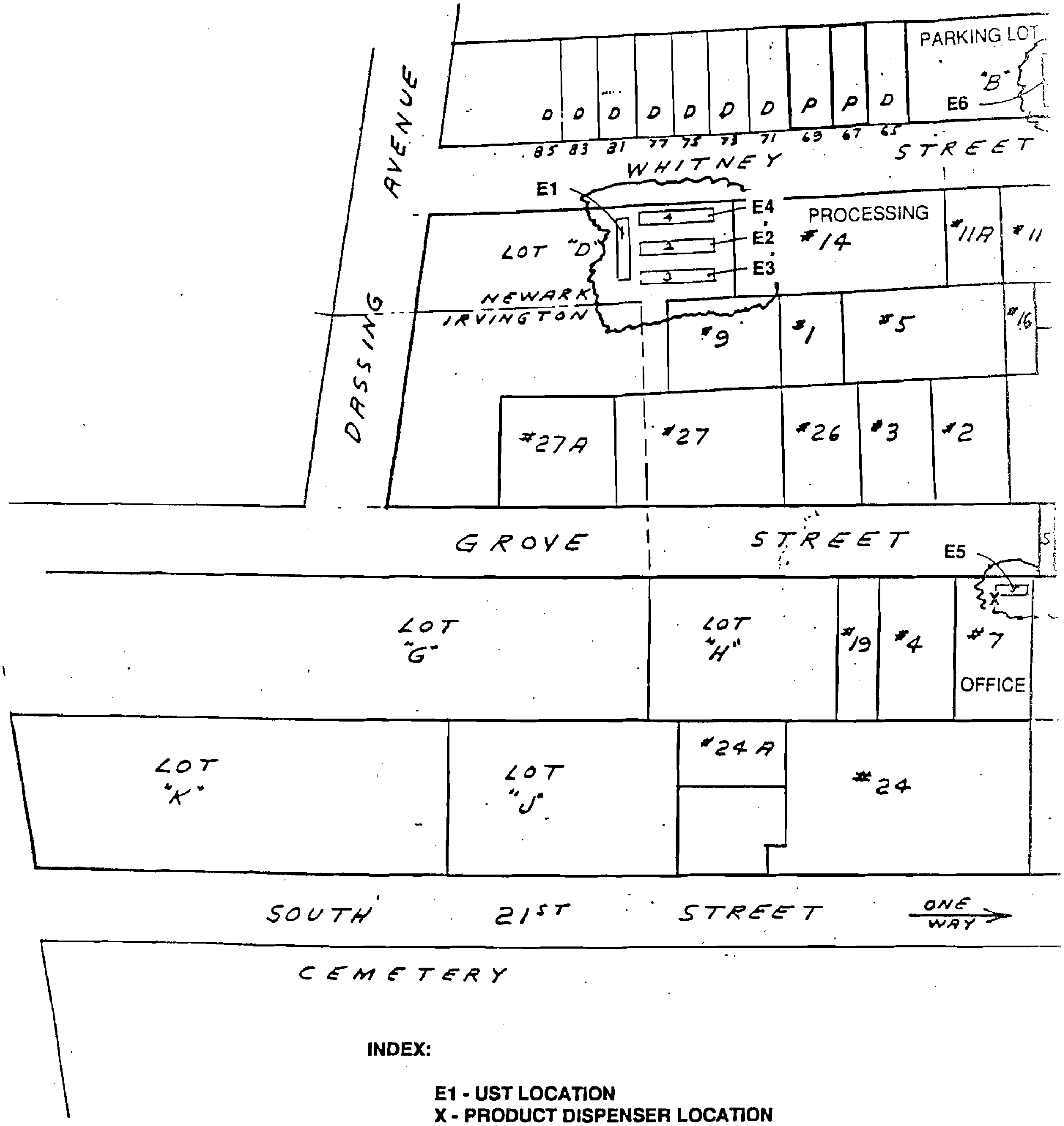
SOURCE: 7.5 Minute Series USGS Quadrangle, Elizabeth, N.J.

0 .5 1 Mile

N

FIGURE 2-1

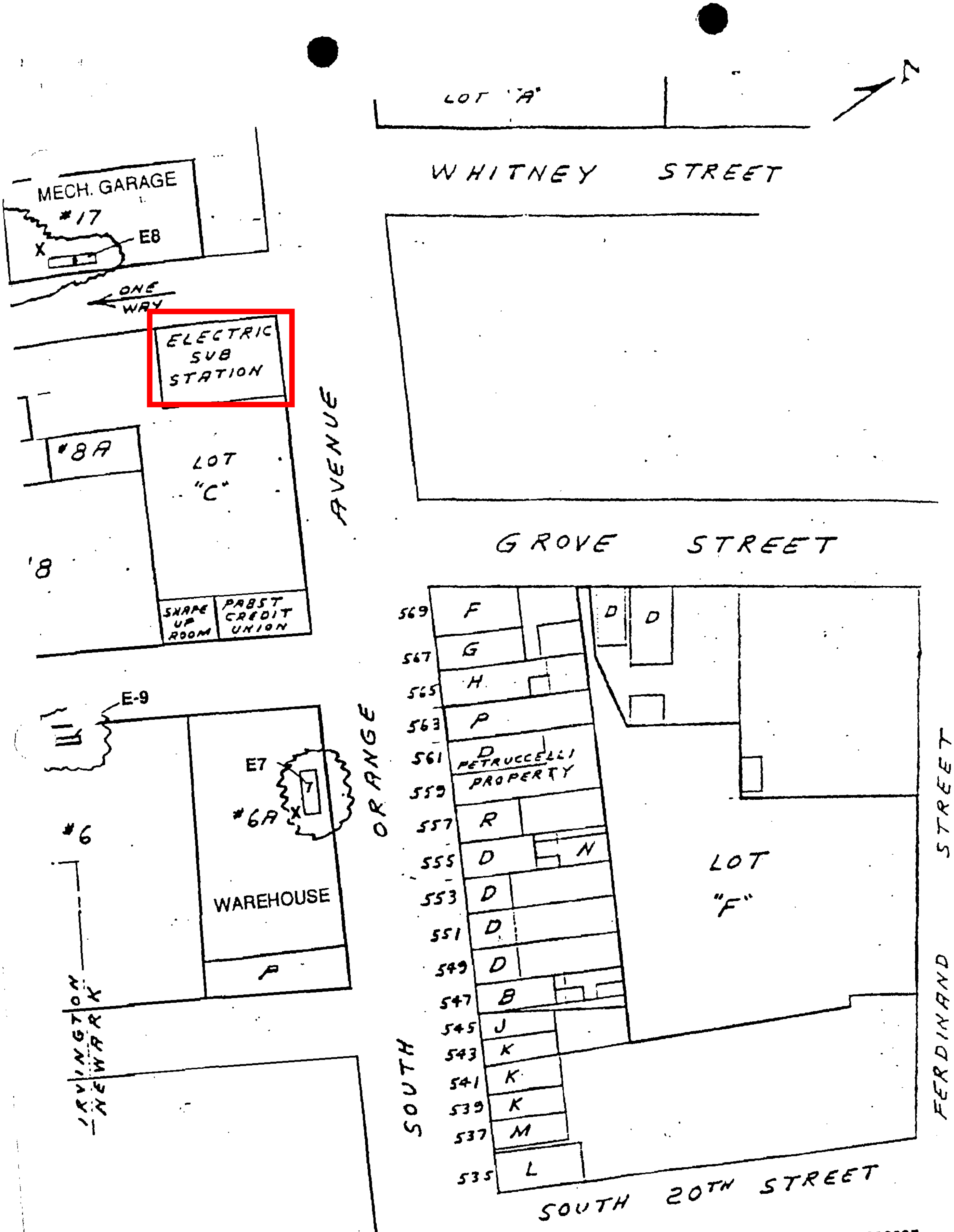
Site Location Map - Pabst Brewery, Newark, New Jersey



INDEX:

E1 - UST LOCATION
X - PRODUCT DISPENSER LOCATION

FNC000226



FNC000227

FIGURE 2-2

UST Site Plan - Pabst Brewery, Newark, New Jersey

Tanks E1 through E3 were certified for excavation, removed and disposed of while E4 was certified to be closed-in-place, subject to NJDEP/BUST and city of Newark Fire Department requirements.

Tank E4 is located partially beneath Grove Street and if excavated would create unstable soil conditions for underground utilities and the street bedding. Therefore Tank E4 was closed-in-place.

Tanks E5, E7, E8, and E9 are steel tanks which are located between building foundations and utility easements along heavily trafficked roadways. Tank E5 is a 4000 gallon steel tank which was used to store #2 diesel fuel for use in Building #7. Tank E7 is actually two, 2000 gallon (interconnected) steel tanks which were used to store leaded gasoline for use by maintenance and warehouse vehicles, pooled in building #6A. Tank E8 is a 1,000 gallon steel tank which was used to store unleaded gasoline for use by autos and trucks pooled in the mechanics garage, Building #17. Tank E9 is a 4,000 gallon steel tank which used to store #2 diesel fuel and is located a short distance from tank E5. All four locations are considered inaccessible for tank removal due to each tanks' location beneath a concrete sidewalk, and between a building foundation and public utility lines.

Tanks E4, E5, E7, E8 and E9 were certified to be closed-in-place, subject to NJDEP/BUST and City of Newark Fire Department requirements.

Tank E6 is a 20,000 gallon fiberglass tank used to store #2 diesel fuel possibly for use in trucks and/or for a compressor or generator in Building #17. This location is lot "B" which is an open area southwest of the mechanic garage, Building #17. The location is a fenced area with gravel and overgrowth vegetation at the surface. Tank E6 was certified for excavation, removed and disposed of, subject to NJDEP/BUST and City of Newark Fire Department requirements.

Table 2-1 is a summary of the above tanks which were addressed under this closure program.

The closure plan was developed and approved in accordance with the NJDEP Technical Guidance Document, "Interim Closure Requirements for Underground Storage Tank Systems", September 1990, and is consistent with the American Petroleum Institute (API) manuals of practice.

TABLE 2-1
Pabst Brewing Company
Underground Storage Tanks

UST No. & Location	Construction Type	Capacity (gal)	Former Tank Contents	Closure Contents	Closure Method	Removal Date	Disposal Date	Close-in-Place Date
E1 @ Lot D[1]	Steel	25,000	#6 Heating Oil		Removal	10/4/91	11/7/91	
E2 @ Lot D[1]	Steel	25,000	#6 Heating Oil		Removal	10/2/91	11/7/91	
E3 @ Lot D[1]	Steel	25,000	#6 Heating Oil		Removal	9/30/91	11/7/91	
E4 @ Lot D	Steel	25,000	#6 Heating Oil	Cement	Close-in-Place			11/6/91
E5 @ Bldg #7	Steel	4,000	#2 Diesel Fuel	Cement	Close-in-Place			12/30/91
E6 @ Lot "B"[2]	Fiberglass	20,000	#2 Diesel Fuel		Removal	10/9/91	10/14/91	
E7A&B @ Bldg #6A	Steel	2 x 2,000 4,000	Gasoline (unleaded)	Cement	Close-in-Place			11/6/91
E8 @ Bldg #17	Steel	1,000	Gasoline (unleaded)	Cement	Close-in-Place			11/6/91
E9 @ Bldg #6	Steel	4,000	#Diesel Fuel	Cement	Close-in-Place			11/6/91

1 Disposed at Naporano Iron and Metal, Newark, NJ Transported by S. Copper Trucking.
2 Disposed by Atlas Environmental, East Orange, NJ

3.0 SUMMARY OF CLOSURE ACTIVITIES AND ANALYTICAL RESULTS

A description of closure field activities associated with the closure program include the following: the site geology and hydrogeology, field closure activities, results of soil sampling, quality assurance/quality control samples, monitoring well installation, groundwater sampling and groundwater analysis results. These activities at tanks E1-E9 are presented in this section.

3.1 Site Geology and Hydrogeology

The geology of the site was determined by review of the Geologic Map of New Jersey and twenty five (25) soil borings installed as part of the site assessments conducted during this closure program.

Review of the soil boring data indicate one predominant unconsolidated geologic unit which was encountered across the area of investigation. Besides fill material which was encountered directly surrounding each tank natural soil materials were found to be present beneath the fill and consist mostly of red-brown, fine to medium sand and gravel with some fine silt and a trace of clay in some areas. Bedrock underlying unconsolidated materials was encountered at a depth of between ten feet to approximately fifteen feet from the ground surface. The bed rock consists of red, fine fractured shale described as part of the Triassic Brunswick Formation (NJ Geologic Map 1950).

The water table was observed during drilling to be present at between approximately twelve (12) and twenty three (23) feet from the ground surface. Stabilized water level readings measured during collection of the groundwater samples indicate the water table surface to be between fifteen (15) feet (e.g. Tank E7), and twenty five (25) feet (e.g. Tank E9) below the ground surface. It should be noted that the top of the well casings have not been surveyed to provide accurate water table elevations; however, enough variation of the water table surface exists on site to determine that the water table slopes downward in a northeast direction in the general direction of the Passaic River which is approximately one mile northeast of the Pabst facility. This is to be expected as this River is likely to be in the direction of the lowest point of elevation for the groundwater table surface within the vicinity of the site.

3.2 Closure Field Activities

The nine UST's identified in Section 2.2 were decommissioned in accordance with the UST Closure Plan dated May 1991 and revised November 1991 Section 2.0. Pumpable liquids and solids were removed; flammable vapors were removed; the tank interiors cleaned; and all UST decommissioned in-place or removed and disposed based upon the approved closure method and API procedures. Table 2-1 is a summary of the closure method used for each tank system.

Soil and groundwater sampling was conducted at each tank location to determine if an impact to the surrounding environment had occurred due to tank or piping failure and/or occasional overfills and spillage. Soil screening for volatile emissions during excavation of tanks was performed using a photoionization detector (PID); and contaminated soil stockpiled for subsequent offsite disposal was also screened with the PID.

The site specific Health and Safety Plan (HASP) was developed as part of the PADST UST closure plan. Daily safety meetings were held prior to each day's work activities to remind the employees of the safety items or practices which must be observed during the course of their duties. No reportable (HASP) events occured during the UST closure implementation program.

3.2.1 Removal of Residual Liquids, Solids, and Sludge

Access to tank interiors was through a cut out in the top of each tank. Pumpable fuel oil or gasoline was pumped from the tanks. Residual liquids were drained, if present, from appurtenant piping including fill, supply, return and gauge lines into the tanks. The tank/piping liquids and residues were removed by using air driven vacuum pumps. A vacuum truck operated by Allstate Power Vac of Linden, NJ, collected all tank residual materials. All liquids and residues were manifested and transported by Allstate Power Vac, a licensed hauler, to a facility permitted to blend clean petroleum product and/or dispose of waste petroleum materials by recycling and processing. The following permitted facilities received waste from this site:

- Clean petroleum product: L&L Oil Recovery
  Aberdeen, NJ
- Waste petroleum materials: S&M Waste Oil
  Milford, NJ

  S&W Waste Inc.
  Kearney, NJ

Copies of all manifests and disposal confirmation are provided in Attachment to this closure summary report.

Three Tanks E5, E7 and E9, had been closed-in-place by a previous owner using sand fill material and unknown methods. The material found in the three tanks was determined to contain residual contamination and therefore was removed and placed in the contaminated soil stockpile located in parking lot "D".

The volume of residual petroleum liquids and waste sludge collected from each tank are outlined on Table 3-1.

3.2.2 Physical Removal and Disposal of Tanks E1, E2, E3, E6

The actual remedial construction for removal and disposal of the storage tanks was performed by ENSR Remediation & Construction, which included management of field excavation and soil stockpile, tank removal, tank cleaning, and disposal of liquid and soil wastes.

On September 24, 1991 excavation began to uncover tanks E1 through E3, which were 25,000 gallon No. 6 heating oil tanks, from beneath the paved surface of lot "D". Care was taken to protect street traffic from excavation debris by the erection of tarps and fencing along Whitney Street.

After the tank contents and residues had been removed, and appurtenant piping removed and was capped, an excavation was made to the top of the tank and access to the interior made to remove flammable or combustible vapors present. An explosimeter device was utilized to record the presence of a flammable or combustible atmosphere within each tank, vapors were vented from each tank prior to any access, cutting and/or entry was made for cleaning purposes and removal.

The concrete spill containment vaults (9 inch-thick) which covered fill piping for each tank was removed along with the asphalt surface. This material along with the soil surrounding the tanks was stockpiled as described above. The excavation was extended to a depth of seven feet, to the top of the tanks in order to gain access to the interior for venting tank vapors and decontaminating the tank. The fill line, fuel supply and return lines and gauge piping connections into the tank were removed and stored on polyethylene sheeting prior to transportation and disposal, piping was plugged at the edge of the excavation hole.

TABLE 3-1

Pabst Brewing Company
Underground Storage Tanks
Residual Product, Sludge and Rinsate

UST Number	Volume
Tank Nos. 1, 2, 3	9,000
Tank No. 4	1,100
Tank No. 5, 8	4,500
Tank No. 6	6,000
Tank No. 7	3,000
Tank No. 9	3,000
Total Volume Removed	26,600 gallons

Once the tanks had been vented of vapors the pumpable liquid contents were removed by a vacuum pump truck operated by Allstate Power Vac, Linden, NJ. Table 3-1 is a summary of the liquid contents removed from each tank.

Tanks E1, E2 and E3 were removed from a single excavation and tank E6 from a separate excavation. Soil removed from these excavations was segregated into two stockpiles based on NJDEP field tests (Soil/Water Agitation, Field Sorption Test) for soil excavations. The contaminated soils were stockpiled on lot "D" with polyethylene sheeting above and below the stockpile. Figure 3-1 represents the contaminated soil stockpile and sampling grid.

Excavation of the four UST's was completed on September 30, October 2, 4 and 9, 1991.

The excavated tanks were placed on level surface and supported against movement with wooden blocks. Interiors of the tanks cleaned and then inspected for corrosion holes and seam leaks before being cut into pieces for transportation to Naporano Iron and Metal, Newark, NJ.

Inspection of the storage tanks indicated; Tanks E1-E3 to be constructed of single wall steel with a capacity of 25,000 gallons; tank E6 to be constructed of single wall fiberglass with a storage capacity of 20,000 gallons. Moderate surface scaling and pitting was observed on the steel tanks at the base of the tanks, but no visible holes noted. No free hydrocarbons were observed on the exterior tank surface or in the underlying soils to indicate an active release.

A certificate of destruction for Tanks E1, E2, E3 and E6 is provided as an attachment to this report.

3.2.3 Closure-In-Place Operations at Tank E4, E5, E7 A&B, E8 and E9

The following work activities were performed during the period from October through December 1991 for Tanks E4, E5, E7A & B, E8 and E9, by ENSR Remediation and Construction. Table 2-1 summarizes dates of closure activities at each tank.

Surface excavations and demolition of concrete pads, sidewalks and curbing were conducted only as necessary, in order to expose piping connected to a tank. Product piping and dispensers were drained and removed and/or capped where working conditions would not allow pipe removal. The excavation at each location was extended approximately 2.5 feet below ground surface to the top of each tank in order to gain access to the interior for venting flammable and combustible vapors, and removal of liquids and solids as described in Section 3.2.2 of this report, (Refer to Table 3-1 for a summary of residuals removed from each tank).

9500A06A

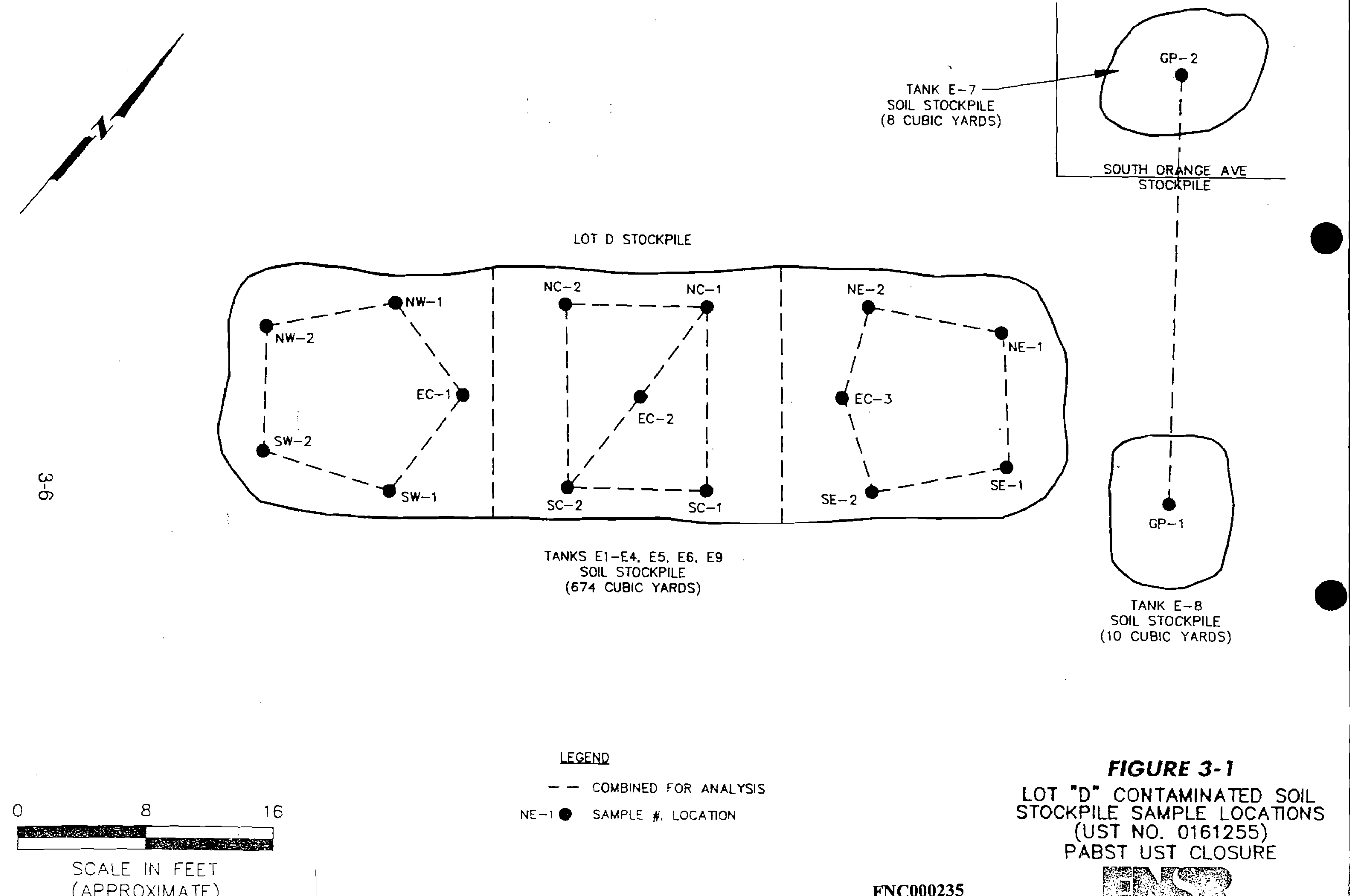


FIGURE 3-1

LOT "D" CONTAMINATED SOIL STOCKPILE SAMPLE LOCATIONS (UST NO. 0161255) PABST UST CLOSURE

ENSR

FNC000235

Access to the tank interior was made into each tank by holes cut into each tank. Excavated soil exhibiting high petroleum odors were encountered at Tanks E5, E8 and E 7, and this soil was placed in stockpiles separately. A sand fill material was found inside tanks E5, E7 and E8 which indicated these tanks had been filled, without removing residual product, and closed. This soil exhibited a high degree of petroleum odor and was stockpiled (lot "D") along with other contaminated soil.

Liquid product was removed by a Vac Truck from Tanks E4 and E9, refer to Table 3-1 for volume of product and type. Once reusable product was removed from each tank, the interiors of each was washed, rinsed, and rinsate removed via Vac Truck.

A combination of clean sand and cement mix was tremied into the tank. Water was added to the combination of solid materials to allow these fill materials to flow freely into the tank interior. This mixture was introduced into Tanks E4, E5, E7 A&B, E8 and E9 until full and overflow from the tank openings occurred. The excavations were backfilled with certified clean fill from Van Orden Sand and Gravel, Ringwood, NJ., to existing grade.

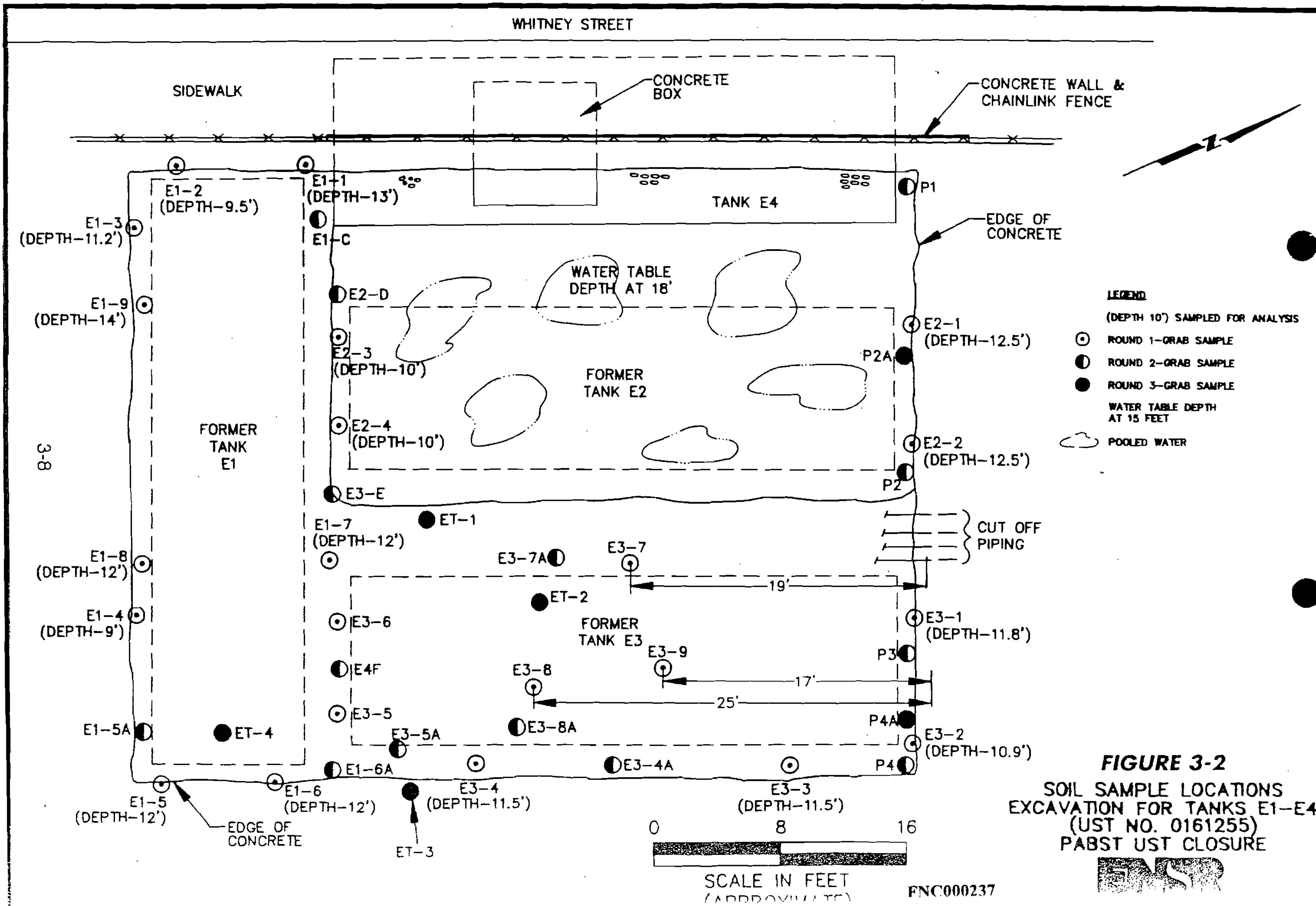
3.2.4 Soil Sampling at Tank E1, E2, E3 and E6

Post-excavation soil samples (Tank Nos. E1,E2,E3, and E6) were collected via grab sampling methods, to provide analytical data on the presence or absence of indicator parameters for the petroleum products stored (No. 6 fuel oil and No. 2 diesel fuel). Samples collected to assess the #6 oil and #2 diesel fuel tanks were analyzed for total petroleum hydrocarbons (TPH). If lab results indicated TPH levels exceeding 100 mg/kg, additional soil was removed from the excavation. No soil exceeding 100 mg/kg TPH was left in the excavation. Post-excavation soil samples were collected from the bottom and sidewalls of the tank excavations. Refer to Figures 3-2 and 3-3 for soil sample locations and excavation details from the two excavations.

3.2.5 Soil Sampling at Tank E4, E5, E7, E8 and E9

During the week of October 23 - November 1, 1991, ENSR geologists supervised the drilling of a total of 19 (completed) soil borings and the installation of three monitoring wells around underground storage Tanks E4, E5, E7, and E8 which had been closed-in-place earlier in October. On December 31, 1991 ENSR supervised the drilling of six soil borings around tank E9 which had been closed-in-place earlier in December 1991. Drilling was conducted by Bucks County Artesian Well Drilling Company utilizing an Ingersoll Rand T-200 hollow stem auger rig to advance the borings at E4 and E8. A more powerful rig, Ingersoll Rand T4-W air rotary rig was used to complete the borings at E5, E7 and E9. Boring logs for each tank area are included in Appendix A. Continuous soil samples were collected from each boring using a split-spoon (barrel)

9500A01A



3-8

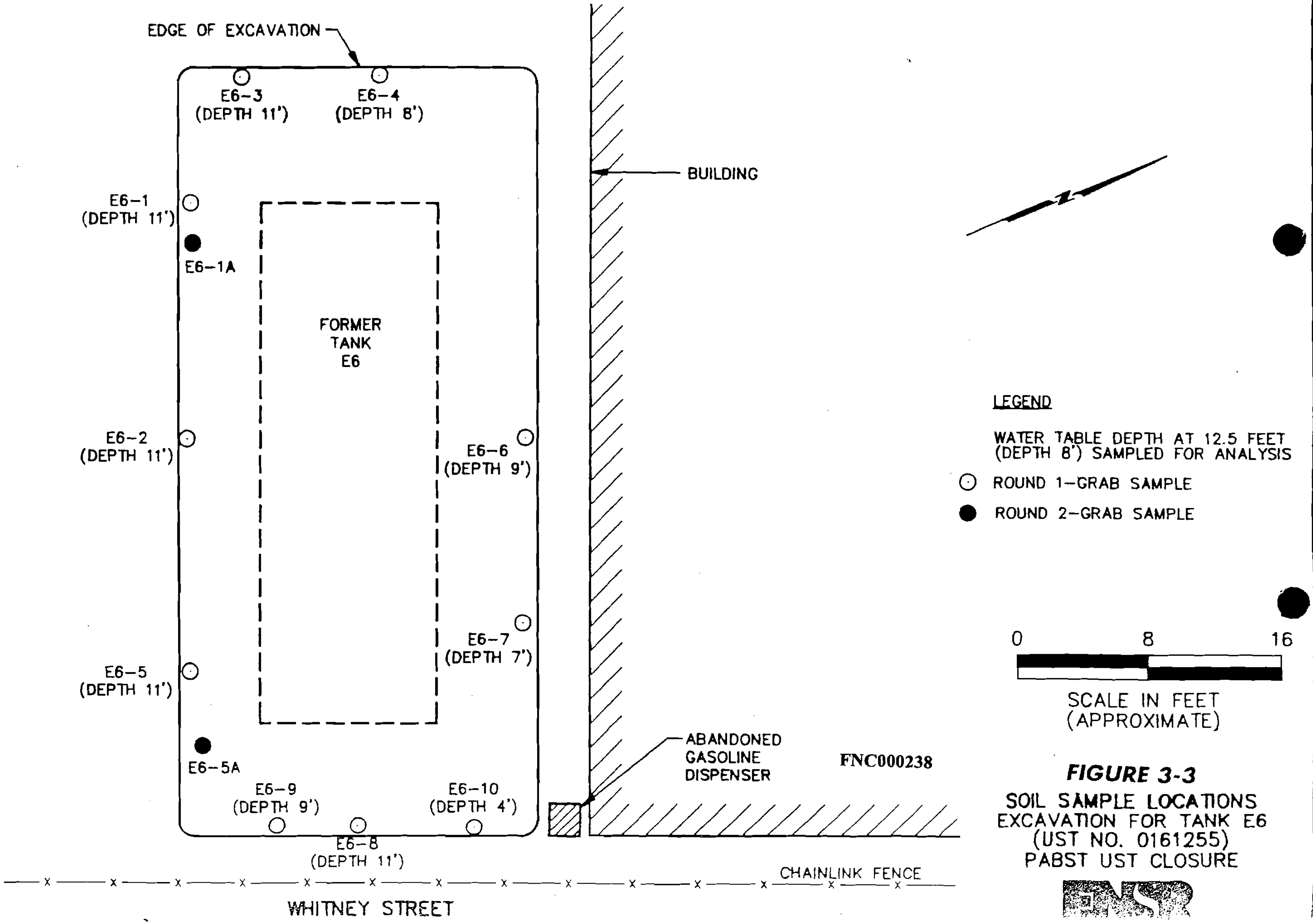
FIGURE 3-2

SOIL SAMPLE LOCATIONS
EXCAVATION FOR TANKS E1-E4
(UST NO. 0161255)
PABST UST CLOSURE

ENSR

FNC000237

950002A



3-9

FNC000238

FIGURE 3-3

SOIL SAMPLE LOCATIONS
EXCAVATION FOR TANK E6
(UST NO. 0161255)
PABST UST CLOSURE

ENSR

sampler. Soil samples were screened with a photoionization detector (PID) to determine the presence or absence of contamination. Each boring was attempted for completion at fifteen (15) feet or refusal.

The sample with the highest PID reading in each boring was submitted for laboratory analysis.

3.2.5.1 Soil Sampling at Tank E4

Tank E4 located at the western edge of the tank excavation in lot "D", was closed-in-place because it lay partially under the Grove Street sidewalk, refer to Figure 3-4 for tank location. Six borings were advanced on the west side of Tank E4 in order to obtain soil samples around the tank. Refusal was encountered in borings B-1 and B-2A, with no sample recovery in those borings. Five soil samples were collected and analyzed for TPH, soil sample #, boring sample No. B3-S3 was also analyzed for BN+15.

3.2.5.2 Soil Sampling at Tank E5

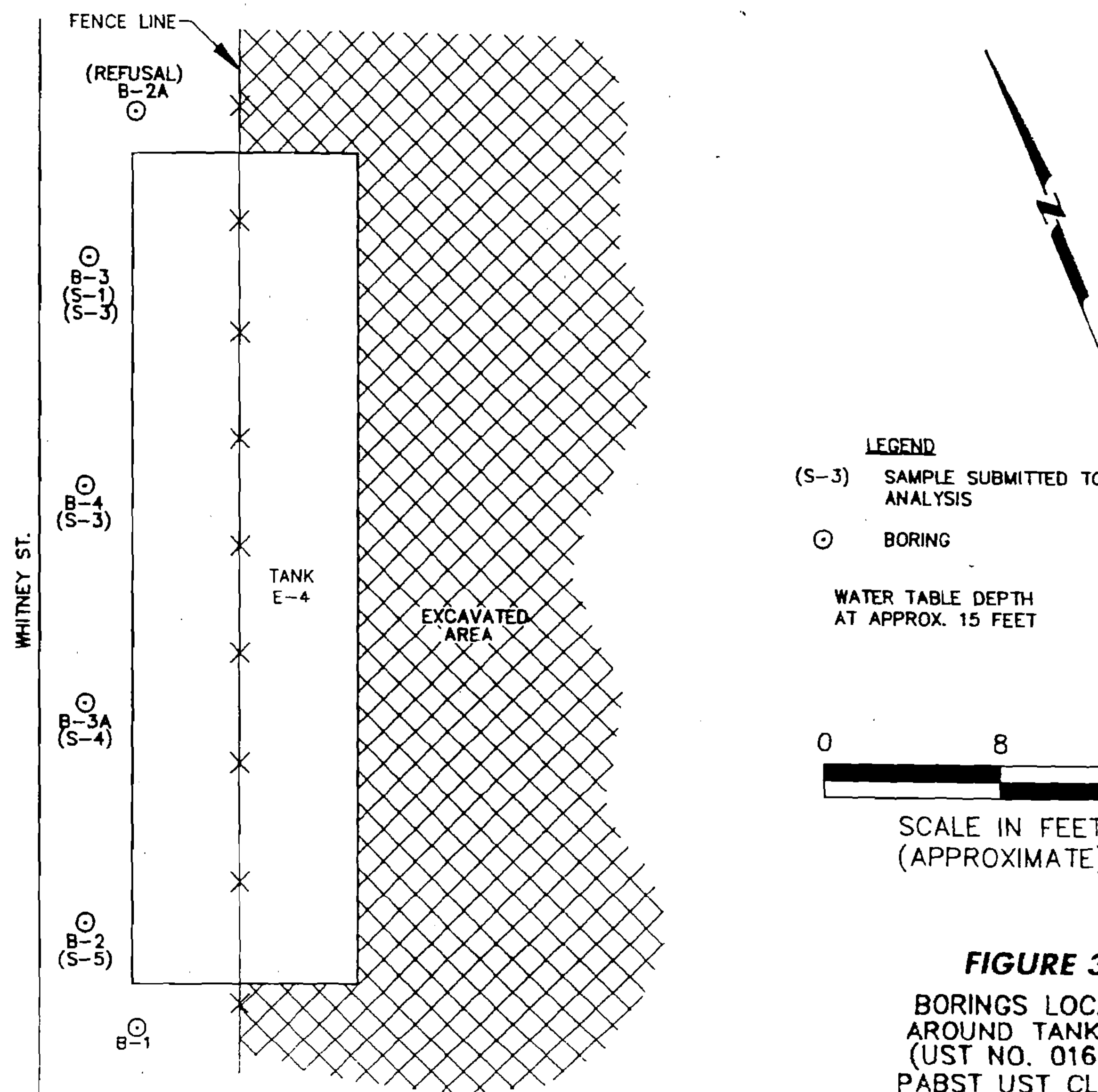
Tank E5 is located beneath the sidewalk along Whitney Street. Refer to Figure 3-5 for tank location. Refusal was encountered at 3.5 feet in borings 1, 1A & 1B therefore a more powerful rig was brought on site for the remainder of the drilling. Eight borings were attempted and five completed around the Grove Street side and each end of the tank. Refusal was encountered in three attempted locations at the north end of the tank. A well was completed because the product stored in this tank was suspect (possibly gasoline) after it was discovered during field operations to actually be a 4000 gallon storage tank.

Fingerprint analysis later verified the tank contents to be #2 diesel fuel. The monitor well therefore, was not sampled as part of closure activities.

3.2.5.3 Soil Sampling at Tank E7 A&B

Tank E7 is located beneath the sidewalk along South Orange Street. Refer to Figure 3-6 for tank location. The tank was initially thought to be a single 2000 gallon tank but during advancement of soil borings around the tank refusal was encountered and it was discovered that two (2) two thousand (2000) gallon tanks were interconnected at this location. Eight soil borings were completed and one groundwater monitoring well installed around Tank E7A and eight samples collected for analysis for volatile organic compounds plus an additional 15 peaks (VOC +15), xylene and lead.

9500A03A



LEGEND

(S-3) SAMPLE SUBMITTED TO LAB FOR ANALYSIS

⊙ BORING

WATER TABLE DEPTH AT APPROX. 15 FEET

0 8 16

SCALE IN FEET (APPROXIMATE)

FIGURE 3-4

BORINGS LOCATED AROUND TANK E-4 (UST NO. 0161255) PABST UST CLOSURE

9500A02A

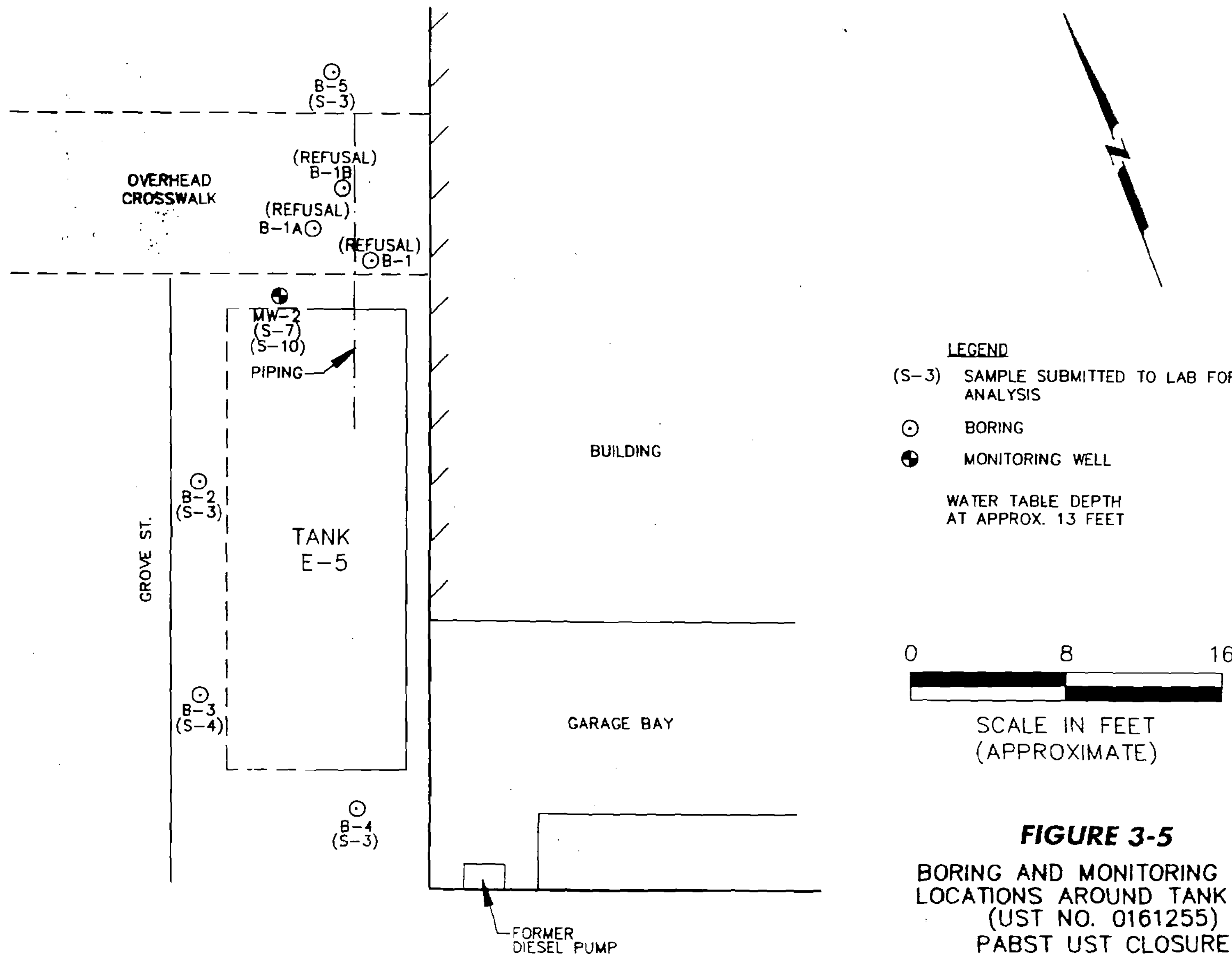


FIGURE 3-5

BORING AND MONITORING WELL LOCATIONS AROUND TANK E-5 (UST NO. 0161255)
PABST UST CLOSURE

ENSR
ENSR CONSULTING & ENGINEERING

9500A04A

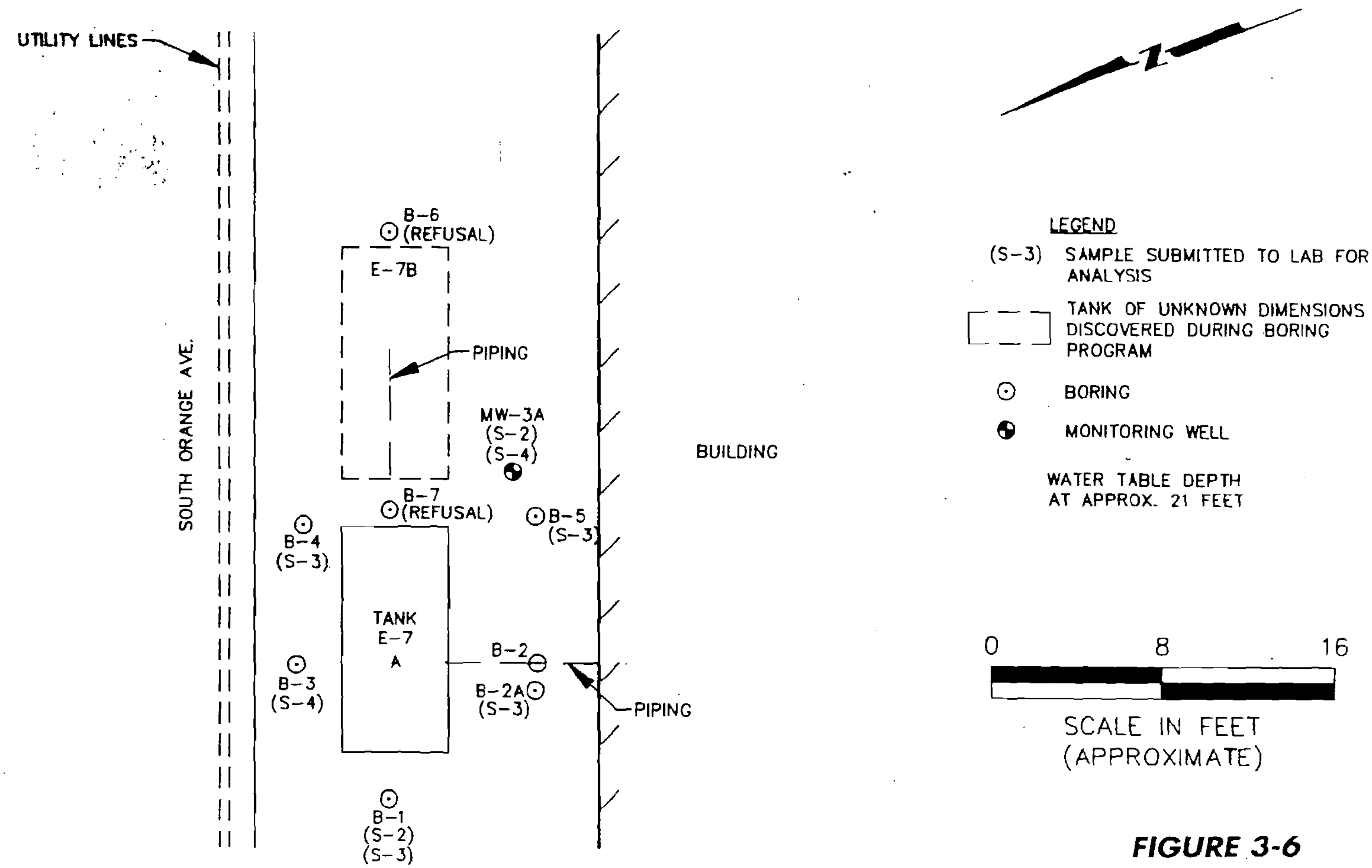


FIGURE 3-6

BORINGS LOCATED AROUND TANK E7 (UST NO. 0161255) PABST UST CLOSURE

ENSR

3.2.5.4 Soil Sampling at Tank E8

Tank E8 is located beneath the sidewalk along Whitney Street near the mechanics garage. Refer to Figure 3-7 for tank location. Four soil borings were advanced around the tank which appears to protrude beneath Whitney Street to the south east. Four samples were collected for analysis for VOC + 15. No piping was encountered, and therefore, no boring was advanced to assess these soil conditions.

3.2.5.5 Soil Sampling at Tank E9

Tank E9 is located beneath the sidewalk along Grove Street. Refer to Figure 3-8 for tank location. Six soil borings were advanced around the Grove Street edge of the tank and each end. One boring was advanced in the vicinity of the former fill pipe. A sample was collected from each boring for analysis for TPH.

3.3 Interpretation of Soil Sampling Results

3.3.1 Lot "D" Tanks E1, E2, E3

Three sets of samples were collected and analyzed for TPH. The first set was taken immediately after the tanks were excavated. The excavation was approximately 12 feet deep where sampled. After the results of the samples were received, and area was marked off where the sample results were above the 100 mg/kg limit. This area was excavated one foot deeper. Approximately 80 cubic yards of additional soil was removed and the area resampled as marked on Figure 3-3.

Since results of this second set of samples contained some samples over the 100 mg/kg limit for TPH, another area was marked off and excavated one foot deeper again. Another 80 cubic yards of soil was removed and stockpiled for later analysis. Once excavated, the area was resampled and the results were all under the 100 mg/kg limit for TPH, refer to Table 3-2 through 3-4 and Table 3-11 for analytical results.

The NJDEP-approved Pabst Brewing Closure Plan, Section 3.3.1 indicated that 25 % of the samples at each of these tanks locations were to also be analyzed for priority pollutant base/neutral organic compounds plus an additional 15 peaks (BN+15). In discussion with Mr. Doug Berry, NJDEP/BUST, the requirement for these samples was clarified and only needed if soil exceeding 100 mg/kg was to remain in the excavation. Regarding the number of samples taken in the lot "D" excavation, the number of samples may be adjusted in the field.

9500A05A

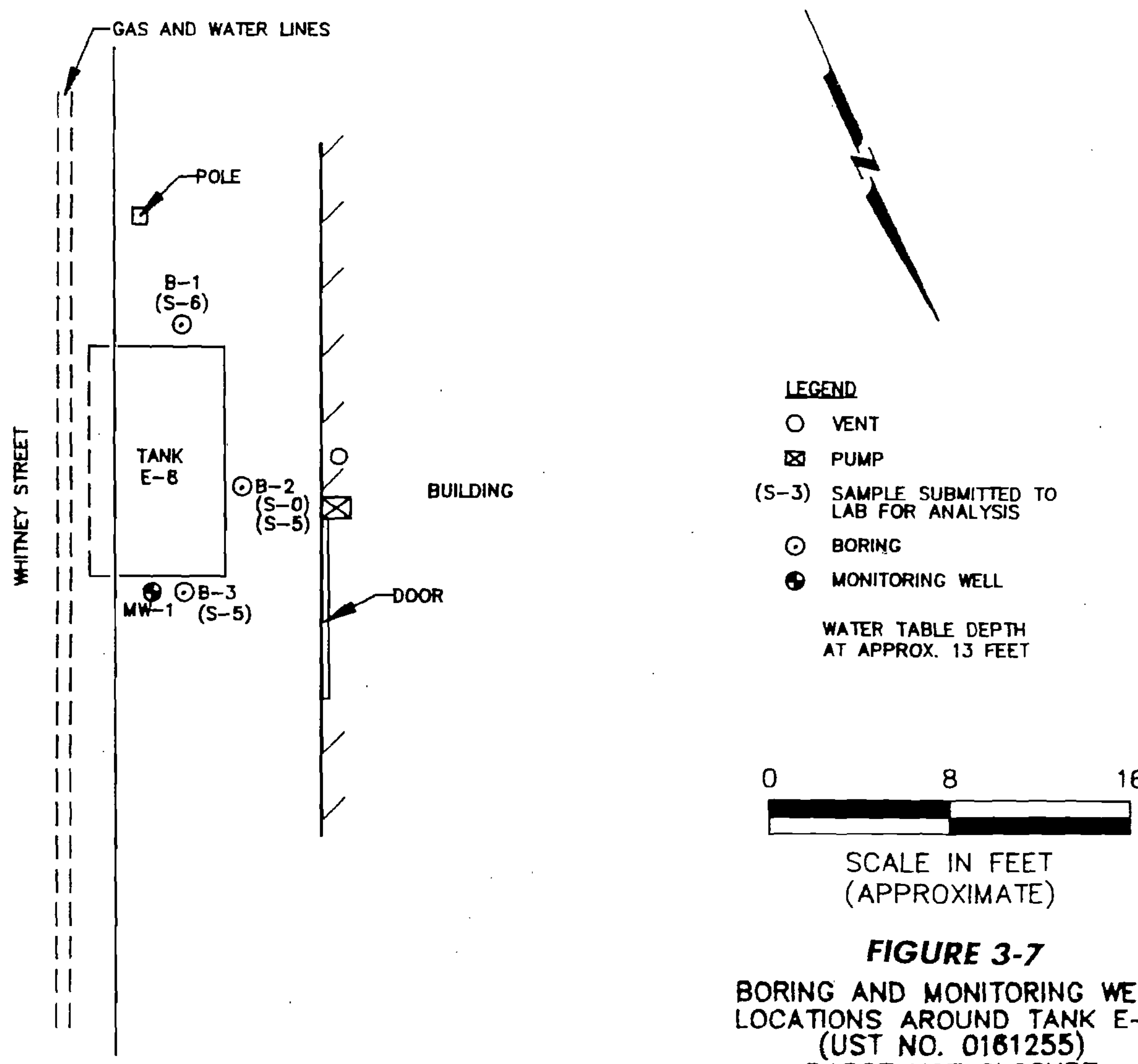
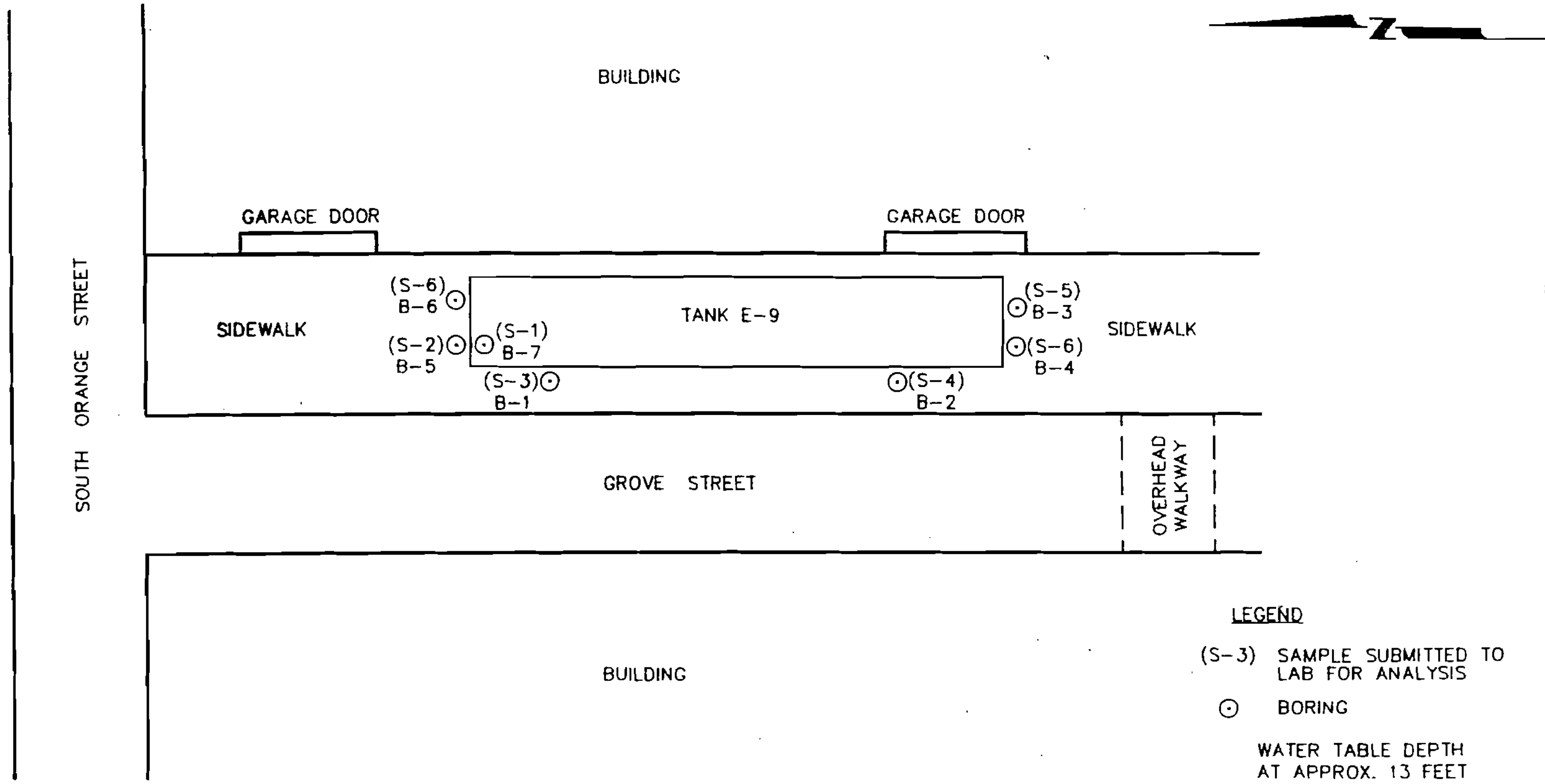


FIGURE 3-7

BORING AND MONITORING WELL LOCATIONS AROUND TANK E-8 (UST NO. 0161255) PABST UST CLOSURE

ENSR

9500A07A



LEGEND

(S-3) SAMPLE SUBMITTED TO LAB FOR ANALYSIS

⊙ BORING

WATER TABLE DEPTH AT APPROX. 13 FEET

0 8 16

SCALE IN FEET (APPROXIMATE)

FIGURE 3-8

BORINGS LOCATED AROUND TANK E9 (UST NO. 0161255) PABST UST CLOSURE

ENSR

ENSR CONSULTING & ENGINEERING

FNC000245

TABLE 3-11
Pabst Brewing Company
Polycyclic Aromatic Hydrocarbons Detected in Sediment Samples

	TANK E1			TANK E2				TANK E3					TANK E4		TANK E6	
ENSR SAMPLE NO.:	E1–3	E1–5	E1–6	E2–1	E2–2	E2–4	FB–1	E3–1	E3–6	E3–8	E3–7B	E3–9	E4–B3–S1	E4–B3–S3	E6–1	E6–5
LAB ID NO.:	57626	57821	57822	57628	57627	57836	57838	57616	57621	57623	58580	57624	59026	59027	57814	57816
COMPOUND (ug/kg)																
NAPHTHALENE	18 J	ND	ND	78 J	71 J	40 J	ND	ND	46 J	ND	67 J	9.6 J	ND	ND	ND	ND
ACENAPHTHYLENE	ND	37 J	42 J	70 J	190 J	35 J	ND	ND	62 J	120 J	100 J	ND	ND	ND	140 J	150 J
ACENAPHTHENE	69 J	56 J	25 J	210 J	300 J	33 J	ND	ND	120 J	110 J	100 J	ND	ND	ND	72 J	93 J
FLUORENE	58 J	41 J	30 J	170 J	240 J	44 J	ND	ND	110 J	110 J	140 J	ND	ND	ND	77 J	130 J
PHENANTHRENE	700	380	310 J	2000	3300	360	ND	44 J	460 J	560 J	1200	ND	ND	ND	1400	1700
ANTHRACENE	170 J	120 J	95 J	490	720	110 J	ND	22 J	140 J	240 J	310 J	ND	ND	ND	310 J	380
FLUORANTHENE	790	830	680	2600	4000	640	ND	320 J	1000	1200	1800 J	ND	ND	ND	2900	2500
PYRENE	540	770	730	1800	2800	590	ND	190 J	880	1100	1500 J	ND	ND	19	2400	2200
CHRYSENE	300 J	520	470	1200	1800	330	ND	130 J	670	810	880	ND	ND	ND	1600	1400
BENZO(A)ANTHRACENE	300 J	430	380	1200	1500	300 J	ND	120 J	580 J	650 J	910	ND	ND	ND	830	1200
BENZO(B)FLUORANTHENE	440	920	830	1900	2800	680	ND	220 J	970	1200	1900	ND	ND	ND	2600	2400
BENZO(K)FLUORANTHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BENZO(A)PYRENE	280 J	430	370	1200	1600	300 J	ND	120 J	570 J	640 J	920	ND	ND	ND	1300	1200
IDENO(1,2,3–C,D)PYRENE	180 J	140 J	120 J	810	920	97 J	ND	91 J	310 J	240 J	310 J	ND	ND	ND	540	400
DIBENZO(A,H)ANTHRACENE	63 J	44 J	ND	260 J	290 J	29 J	ND	31 J	100 J	88 J	91 J	ND	ND	ND	120 J	120 J
BENZO(GHI)PERYLENE	150 J	110 J	100 J	700	860	82 J	ND	78 J	320 J	260 J	250 J	ND	ND	ND	420	290 J
SUBTOTAL:	4058	4828	4182	14688	21391	3670	0	1366	6338	7328	10478	9.6	0	19	14709	19773
TENTATIVELY IDENTIFIED COMPOUNDS (TICS)	220	15380	10470	6640	11640	6060	0	ND	22520	21330	4560	ND	ND	12600	8180	7950
TOTAL (ug/kg):	4278	20208	14652	21328	33031	9730	0	1366	28858	28658	15038	9.6	0	12619	22889	27723
TPH (mg/kg)	ND	523	511	ND	ND	339	ND	ND	1310	957	NS	ND	ND	799	316	210

J–less than the specified detection limit but greater than zero (approximate value)

Changes to the original closure plan are due to the close proximity of the four tanks. Any samples taken in-between the tanks that would overlap would qualify for both tanks. Soil samples taken on the northeastern side of former Tank E1 also qualify; at tank E4, samples at the southeast corner; former Tank E2 south end; and former Tank E3 south end. Also, samples collected between former Tanks E3 and E2 overlap and qualify for both tanks. The actual number of samples collected and analyzed for BN+15 varies from the original closure plan because of the second and third deepened excavations which resulted in non detectable levels of TPH in the excavation.

3.3.2 Piping at Lot "D" Tanks E1-E3

Four samples were initially taken under the piping, northeast excavation wall see Figure 3-2 and Table 3-2A. The analytical results indicated two area of elevated TPH. Additional soil was removed from these areas and then resampled. Results of the second round of samples were within DEP regulatory limits.

3.3.3 Results at Tank E4

The results of the five soil samples analyzed for TPH are presented in Table 3-5. Soil samples were collected on October 31, 1991. The highest TPH sample from B-3 was also analyzed for BN+15. PID screening was conducted during boring advancement, and measured values were 0 ppm in all borings. The soil samples from B-2 and B-3 were below detection limits and the samples from B-3A, B-4 and B-3 contained 32, 239 and 799 mg/kg TPH respectively from depths of 15-20 feet below ground surface (bgs). Groundwater in the vicinity of the tank as determined from boring B-3A is approximately 13 feet bgs. The highest levels of TPH at this tank are below the NJDEP action levels.

3.3.4 Results at Tank E5

The results of the six soil samples analyzed for TPH are presented in Table 3-6. Soil samples were collected on October 31, 1991. Petroleum odor was present in all borings during drilling, and PID screening values, conducted during boring advancement, ranged between 19 ppm at B-2 to 100 ppm in B-5 at the bedrock surface. laboratory results confirmed the field measurements with TPH concentrations ranging from 91 mg/kg to 7430 mg/kg at the surface of the bedrock approximately 10 feet below ground surface (bgs). Groundwater in the vicinity of the tank as determined from boring MW-2 is approximately 13 feet bgs. The highest levels of TPH are found at the North edge of the tank along Grove Street. A pipe gallery in this area might be responsible for the elevated TPH values. The concentrations of TPH reported from laboratory exceed the

TABLE 3-5

Pabst Brewing Company
Samples Collected Around Tank E4

ENSR SAMPLE NUMBER	LAB NO.	SAMPLING METHOD	DEPTH SAMPLED ft.	TPH (mg/kg)	PAH (ug/kg)	TICS (ug/kg)	TOTAL PAH+15 (ug/kg)
E4-B2-S5	59695	split spoon	10-12	ND			
E4-B3A-S4	59694	split spoon	15-17	32			
E4-B4-S4	59696	split spoon	15-16	239			
E4-B3-S1	59026	split spoon	14-16	ND	ND	ND	
E4-B3-S3	59027	split spoon	18-20	799	19	12600	12729

all depths are approximate
TPH= total petroleum hydrocarbons
method detection limit for TPH is 25 mg/kg
TICS=tentatively identified compounds-sum of 15 reported quantities
PAH=polycyclic aromatic hydrocarbons

FNC000248

TABLE 3-6

Pabst Brewing Company
Samples Collected Around Tank E5

ENSR SAMPLE NUMBER	LAB NO.	SAMPLING METHOD	DEPTH SAMPLED (ft)	TPH (mg/kg)
E5-MW2-S7	59697	split spoon	13-15	4540
E5-MW2-S10	59698	split spoon	24	408
E5-B2-S3	59700	split spoon	6-8	91
E5-B3-S4	59691	split spoon	8-10	3430
E5-B4-S3	59692	split spoon	7-9	110
E5-B5-S3	59693	split spoon	7-9	7430

E5A analyzed for petroleum fingerprint

all depths are approximate
TPH=total petroleum hydrocarbons
method detection limit for TPH is 25 mg/kg
TICS=tentatively identified compounds
PAH=polycyclic aromatic hydrocarbons

FNC000249

NJDEP action levels. On November 27, 1991 ENSR contacted the NJDEP "hotline" to report the soils data, case number 91-11-27-1214-05 was assigned by the NJDEP.

3.3.5 Results at Tank E6

The excavated area around tank E6 is represented by Figure 3-3. The first samples indicated an elevated level exceeding 100 mg/kg TPH on the south side of the excavation. The initial excavation was approximately 12 feet deep. The floor of the excavation was made one foot deeper and the south wall was excavated another two feet. Another set of samples were taken and the results indicated the area was clean, refer to Table 3-7 for analytical results.

3.3.6 Results at Tank E7 A&B

Eight soil samples were analyzed for VOC's +15, xylene and lead, the laboratory results are presented in Table 3-8. Soil samples were collected on October 31 and November 1, 1991. Headspace screening of split-spoon samples was performed with a PID during boring installation, the values ranged between 1 ppm in B-6 to 500 ppm in MW-3A at the bedrock surface< approximately 10 feet bgs. Groundwater in the vicinity of the tank is approximately 23 feet from boring MW-3A. Laboratory results confirmed the field measurements with VOC concentrations ranging from 5340 ug/kg to 791000 ug/kg the highest concentrations occurring at depths of 6-8 feet in boring B1. Lead was present above detection limits in two borings and one piping grab sample. The samples from B-1, B-2A and L1 contained 11, 8.2, and 12 mg/kg respectively. These levels are below the NJDEP action levels. The concentrations of VOCs reported by the laboratory exceed the NJDEP action levels. On November 27, 1991 ENSR contacted the NJDEP to report the soils data.

3.3.7 Results at Tank E8

Four soil samples were analyzed for VOC's +15 and xylene, the laboratory results are presented in Table 3-9. Soil samples were collected on October 23-24, 1991. Headspace screening of split spoon samples was performed with a PID during boring installation, the values in each boring were 360 ppm at depth of 10-12 feet bgs. Groundwater in the vicinity of the tank is approximately 13 feet from boring B-3. laboratory results confirmed the field measurements with VOC concentrations ranging from 199200 ug/kg to 743400 ug/kg the highest concentrations occurring at depths of 12-14 feet bgs in boring B-3. The concentrations of VOCs reported by the laboratory exceed the NJDEP action levels. On November 27, 1991 ENSR contacted the NJDEP to report the soils data.

Two contaminated soil stockpiles were located on lot "D" between Grove Street and Drassing Avenue (Tank Nos. E1-E4, E5, E9, E8) and one contaminated soil stockpile in a parking lot at the corner of S. Orange Avenue and S. 21st Street (Tank E7). Soil samples were collected and composite samples analyzed for disposal purposes. Upon receipt of sample results the soil was accepted for use in brick manufacturing process at Riverside, Brick & Supply, Richmond, VA. The soil was transported by Horwith Trucking, North Hampton, PA. The areas occupied by these soil piles were broom sweep and washed to rinse away remaining dirt. Refer to Figure 3-1 for contaminated soil stockpile location and sampling grid. Analytical results for stockpiled soils are included in Appendix D.

3.6 Monitoring Well Installation

Groundwater monitoring wells were installed at former gasoline tank locations E7 and E8 due to gasolines having a lower maximum residual saturation coefficient in soils than fuel oils, and it is more likely to reach the water table if a release occurs. These wells were discussed as requirements in the NJDEP approved Closure Plan for this site. One groundwater monitoring well was installed downgradient of each gasoline tanks (Tanks E7A&B and E8) for a total of two wells. According to the Closure Plan the wells were to be installed to a depth of 25 feet, assuming groundwater is at a depth of 15 feet and bedrock not encountered. Monitoring well MW-3 installed near tank E7 A&B was completed at a depth of 29 feet bgs, bedrock was encountered at a depth of 7 feet bgs, refer to appendix B for construction detail. Monitoring well MW-1 installed near tank E8 was completed at a depth of 16 feet bgs, refer to appendix B for construction details.

3.7 Groundwater Sampling

Prior to sampling the two groundwater monitoring wells were developed using a submersible pump. The pump discharge was drained into a drum for later disposal. The pump was run until the discharged water became clear of color and free of silt, physical parameters were recorded.

On January 22, 1992 two ENSR geologists sampled the site groundwater from the two wells according to NJDEP sampling guidelines. Three well volumes were purged from each well prior to sample collection. A sample of groundwater was then collected from each well following NJDEP sampling protocol. Samples were kept chilled and shipped under chain-of-custody via overnight courier to ENVIROTECH RESEARCH, INC., of Edison, NJ. ENVIROTECH is state-certified for this analysis.

FNC000251

3.8 Groundwater Analysis Results and Discussion

Groundwater samples collected from Tanks E7 and E8 were analyzed for volatile organics, MTBE, TBA using EPA method 624. The samples from Tank E7 (MW-3A), and Tank E8 (MW-1) contained 15960 ug/l, and 38800 ug/l, respectively, total dissolved VOCs; 100 ug/l, and 48 ug/l, respectively of MTBE; 1500 ug/l, and non-detectable, respectively of TBA. Refer to Table 3-12 for summary of analytical results.

The reported results presented in the above paragraph represent concentration levels which exceed the NJDEP drinking water guidelines and should be reported to the NJDEP.

FNC000252

TABLE 3-12

Pabst Brewing Company
Groundwater Samples Collected Tank E7, E8

ENSR Sample Number	Lab Number	VOCS (ug/l)	BTEX (ug/l)	TICS (ug/l)	MTBE (ug/1)	TBA (ug/l)
Tank 7 MW-3A	62792	15960	15960	6010	48	ND
Tank 8 MW-1	62791	38800	38800	15200	100	1500

VOC=volatile organics
TICS=tentatively identifeid compounds- sum of 15 compounds
MTBE=methly-tertiary-butyl-ether
TBA=tertiary-butyl-alcohol
BTEX=benzene, toluene, ethyl benzene, xylene
ND=non-detectable

FNC000253

KEYSTONE LAB - MONROEVILLE

Summary of Analytical Results

Date received: 7-NOV-1991 Customer: ENSR Remediation and Construction Job name: M91-11-27

		Samples			
Keystone ID		27-003	27-004	27-005	27-006
Date Sampled		6-NOV-1991	6-NOV-1991	6-NOV-1991	6-NOV-1991
Customer ID		COMP, NW-1,NW-2,SW-1,SW-2,EC--2,EC-2	COMP,NC-1,NC-2,SC-1,SC	COMP,NE-1,NE-2,SE-1,SE -2,EC-3	COMP,GP-1,GP-2
Parameters	**Units**				
%Solids at 103°C	%	93.7	94.5	91.3	97.5
Flash Point	degree F	>200	>200	>200	>200
pH	units	8.8	8.8	8.7	8.8
Total Organic Halogens	mg/kg	44.6	21.1	25.5	25.3
Total Petroleum Hydrocarbons					
Non-polar	mg/Kg	843	559	12500	<51.3
Polar	mg/Kg	406	491	3940	<51.3

KEYSTONE LAB -- MONROEVILLE

Summary of Analytical Results

Date received: 7-NOV-1991 Customer: ENSR Remediation and Construction Job name: M91-11-27

		Samples			
Keystone ID		27-003	27-004	27-005	27-006
Date Sampled		6-NOV-1991	6-NOV-1991	6-NOV-1991	6-NOV-1991
Customer ID		COMP, NW-1,NW-2,SW-1,SW-2,EC-1	COMP,NC-1,NC-2,SC-1,SC-2, EC-2	COMP,NE-1,NE-2,SE-1,SE-2, EC-3	COMP,GP-1,GP-2
Parameters	Units				
TCLP Metals					
Arsenic	ug/L	<100	<100	<100	<100
Barium	ug/L	802	596	750	519
Cadmium	ug/L	<5.00	<5.00	<5.00	<5.00
Chromium	ug/L	<10.0	<10.0	<10.0	<10.0
Mercury	ug/L	<0.200	<0.200	<0.200	<0.200
Lead	ug/L	<100	<100	183	<100
Selenium	ug/L	<200	<200	<200	<200
Silver	ug/L	<10.0	<10.0	<10.0	<10.0

KEYSTONE LAB - MONROEVILLE

Summary of Analytical Results

Date received: 7-NOV-1991 Customer: ENSR Remediation and Construction Job name: M91-11-27

		Samples			
Keystone ID		27-003	27-004	27-005	27-006
Date Sampled		6-NOV-1991	6-NOV-1991	6-NOV-1991	6-NOV-1991
Customer ID		COMP, NW-1,NW-2,SW-1,SW-2,	COMP,NC-1,NC-2,SC-1,SC-2,EC-2	COMP,NE-1,NE-2,SE-1,SE-2,EC-3	COMP,GP-1,GP-2
Parameters	Units				
POLYCHLORINATED BIPHENYLS					
Arochlor 1016	ug/Kg	<85.4	<84.7	<87.6	<82.1
Arochlor 1221	ug/Kg	<85.4	<84.7	<87.6	<82.1
Arochlor 1232	ug/Kg	<85.4	<84.7	<87.6	<82.1
Arochlor 1242	ug/Kg	<85.4	<84.7	<87.6	<82.1
Arochlor 1248	ug/Kg	<85.4	<84.7	<87.6	<82.1
Arochlor 1254	ug/Kg	2560	1650	1640	<164
Arochlor 1260	ug/Kg	<171	<169	<175	<164
POLYCHLORINATED BIPHENYLS Surrogates					
2,4,5,6-Tetrachlorometaxylene	% Recovery	109	106	84.2	99.6
Dibutylchlorendate	% Recovery	Matrix Int.	137	94.3	79.3
8020X					
Benzene	ug/Kg	<21.3	<21.2	<43.8	<20.5
Toluene	ug/Kg	<21.3	<21.2	683	<20.5
Ethylbenzene	ug/Kg	<21.3	<21.2	717	36.0
Xylenes	ug/Kg	103	39.3	5000	185
8020X SURROGATES					
Benzotrifluoride	% Recovery	118	114	119	116

KEYSTONE LAB - MONROEVILLE

Summary of QA/QC Results

Date received: 7-NOV-1991 Customer: ENSR Remediation and Construction Job name: M91-11-27

		Samples		
Keystone ID		27-001	27-002	27-007
Sampling Point		QA_QC	QA_QC	QA_QC
Customer ID		LAB BLANK	LAB CONTROL SAMPLE	MS
Parameters	**Units**			
Total Organic Halogens	mg/Kg	<2.00	103 % Rec.	NR
TCLP Metals				
Arsenic	ug/L	<100	99.9 % Rec.	95.0 % Rec.
Barium	ug/L	<300	96.1 % Rec.	92.2 % Rec.
Cadmium	ug/L	<5.00	110 % Rec.	104 % Rec.
Chromium	ug/L	<10.0	94.0 % Rec.	83.5 % Rec.
Mercury	ug/L	<0.200	107 % Rec.	97.4 % Rec.
Lead	ug/L	<100	93.2 % Rec.	91.1 % Rec.
Selenium	ug/L	<200	106 % Rec.	100 % Rec.
Silver	ug/L	<10.0	89.2 % Rec.	83.0 % Rec.

KEYSTONE LAB - MONROEVILLE

Summary of QA/QC Results

Date received: 7-NOV-1991 Customer: ENSR Remediation and Construction Job name: M91-11-27

		Samples	
Keystone ID		27-001	27-002
Sampling Point		QA_QC	QA_QC
Customer ID		LAB BLANK	LAB CONTROL SAMPLE
Parameters	**Units**		
POLYCHLORINATED BIPHENYLS			
Arochlor 1016	ug/Kg	<80.0	NR
Arochlor 1221	ug/Kg	<80.0	NR
Arochlor 1232	ug/Kg	<80.0	NR
Arochlor 1242	ug/Kg	<80.0	NR
Arochlor 1248	ug/Kg	<80.0	97.2 % Rec.
Arochlor 1254	ug/Kg	<160	NR
Arochlor 1260	ug/Kg	<160	NR
POLYCHLORINATED BIPHENYLS Surrogates			
2,4,5,6-Tetrachlorometaxylene	% Recovery	114	111
Dibutylchlorendate	% Recovery	88.3	93.6
8020X			
Benzene	ug/Kg	<20.0	104 % Rec.
Toluene	ug/Kg	<20.0	105 % Rec.
Ethylbenzene	ug/Kg	<20.0	105 % Rec.
Xylenes	ug/Kg	<30.0	105 % Rec.
8020X Surrogates			
Benzotrifluoride	% Recovery	100	115

ATTACHMENT 25

Permit No.: NJ0021016

RECEIVED Name of Permittee:

JAN 31 10 57 AM '75 Passaic Valley Sewerage Commission

Effective Date: February 28, 1975

DEPT. ENVIR. PROTECT. DIV. OF WATER RESOURCES Expiration Date: June 30, 1977

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

PERMIT TO DISCHARGE

In reference to the application received from the above-mentioned permittee for a permit authorizing the discharge of pollutants in compliance with the provisions of the Federal Water Pollution Control Act, as amended by the Federal Water Pollution Control Act Amendments of 1972, P. L. 92-500, October 18, 1972 (33 U.S.C. §§1251-1376) (hereinafter referred to as "the Act"),

Passaic Valley Sewerage Commissioners (P.V.S.C.)

(hereinafter referred to as "the Permittee")

is authorized by the Regional Administrator, Region II, U.S. Environmental Protection Agency, to discharge from:

the P.V.S.C. Sewage Treatment Plant, 600 Wilson Avenue, Newark, New Jersey, and other locations noted herein

to receiving waters named Upper New York Bay, Third River, Newark Bay, Passaic River, and other receiving waters noted herein in accordance with the following conditions.

A. GENERAL CONDITIONS

1. All discharges authorized herein shall be consistent with the terms and conditions of this permit. The discharge of any pollutant more frequently than, or at a level in excess of, that identified and authorized by this permit shall constitute a violation of the terms and conditions of this permit. Such a violation may result in the imposition of civil and/or criminal penalties as provided for in Section 309 of the Act. Facility modifications, additions, and/or expansions that increase the plant capacity must be reported to the the permitting authority and this permit then modified or reissued to reflect such changes. Any anticipated change in the facility discharge, including any new significant industrial discharge or significant changes in the quantity or quality of existing industrial discharges to the treatment system that will result in significant new or increased discharges of pollutants must be reported to the Regional Administrator. Modifications to the permit may then be made to reflect any necessary changes in permit conditions, including any necessary effluent limitations for any pollutants not identified and limited herein. In no case are any new connections, increased flows, or significant changes in influent quality permitted that will cause violation of the effluent limitations specified herein.

2. After notice and opportunity for a hearing, this permit may be modified, suspended, or revoked in whole or in part during its term for cause including, but not limited to, the following:

   a. violation of any terms or conditions of this permit;

   b. obtaining this permit by misrepresentation or failure to disclose fully all relevant facts; or,

   c. a change in any condition that required either a temporary or permanent reduction or elimination of the permitted discharge.

3. Notwithstanding 2 above, if a toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established under Section 307(a) of the Act for a toxic pollutant which is present in the discharge authorized herein and such standard or prohibition is more stringent than any limitation upon such pollutant in this permit, this permit shall be revised or modified in accordance with the toxic effluent standard or prohibition and the permittee shall be notified.

4. The permittee shall allow the head of the State water pollution control agency, the Regional Administrator, and/or their authorized representatives, upon the presentation of credentials:

a. to enter upon the permittee's premises where an effluent source is located or in which any records are required to be kept under the terms and conditions of this permit;

b. to have access to and copy at reasonable times any records required to be kept under the terms and conditions of this permit;

c. to inspect at reasonable times any monitoring equipment or monitoring method required in this permit;

d. to sample at reasonable times any discharge of pollutants;

e. to inspect the operation of the treatment facilities.

5. The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of Federal, State, or local laws or regulations; nor does it obviate the necessity of obtaining State or local assent required by law for the discharge authorized.

6. This permit does not authorize nor approve the construction of any onshore or offshore physical structures of facilities or the undertaking of any work in any navigable waters.

7. Except for data determined to be confidential under Section 308 of the Act, all monitoring reports required by this permit shall be available for public inspection at the offices of the head of the State water pollution control agency and the Regional Administrator. Knowingly making any false statement on any such report may result in the imposition of criminal penalties as provided for in Section 309 of the Act.

8. The diversion or bypass of any discharge from the treatment works by the permittee is prohibited, except: (1) where unavoidable to prevent loss of life or severe property damage; or (2) where excessive storm drainage or runoff would damage any facilities necessary for compliance with the terms and conditions of this permit. The permittee shall notify the Regional Administrator in writing within 72 hours of each diversion or bypass in accordance with the procedure specified above for reporting non-compliance. Within 30 days after such incident the permittee shall submit to EPA for approval a plan to prevent recurrence of such incidents. Normal operation of overflows and bypasses (listed in Section C-1) should not be reported under the requirements of this condition. The notification and plan herein required apply only to discharges resulting from unusual situations such as breakdowns, power failures, and bypasses occurring during dry weather periods. A summary description of discharges from bypass points should be submitted with the permittee's quarterly self-monitoring reports.

9. If for any reason the permittee does not comply with or will be unable to comply with any effluent limitation (treated effluent discharges) specified in this permit, or should any unusual or extraordinary discharge of wastes occur from the facilities herein permitted, the permittee shall immediately notify the Regional Administrator and appropriate State agency by telephone and provide the same authorities with the following information in writing within five days of such notification:

   a. A description of the non-complying discharge including its impact upon the receiving waters.

   b. Cause of non-compliance.

   c. Anticipated time the condition of non-compliance is expected to continue, or if such condition has been corrected, the duration of the period of non-compliance.

   d. Steps taken by the permittee to reduce and eliminate the non-complying discharge.

   e. Steps to be taken by the permittee to prevent recurrence of the condition of non-compliance.

10. Permittee shall take all reasonable steps to minimize any adverse impact to navigable waters resulting from non-compliance with any effluent limitation specified in this permit. The permittee will also provide accelerated or additional monitoring as necessary to determine the nature and impact of the non-complying discharge.

11. Except as provided in permit condition 8 on bypassing, nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for non-compliance.

12. Nothing in this permit shall be construed to preclude the institution of any legal action nor relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State law or regulation under authority preserved by Section 510 of the Act.

13. In the event of any change in control or ownership of facilities from which the authorized discharges emanate, the permittee shall notify the succeeding owner or controller of the existence of this permit by letter, a copy of which shall be forwarded to the Regional Administrator and the State water pollution control agency.

14. The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

15. The permittee shall require the municipalities using the PVSC treatment works to report the following conditions to the permittee; the permittee shall then provide notice of the following to the Regional Administrator:

a. any new introduction of pollutants into such treatment works from a source which would be a new source as defined in section 306 of the Act if such source were discharging pollutants;

b. any new introduction of pollutants which exceeds 10,000 gallons on any 1 day into such treatment works from a source which would be subject to section 301 of the Act if such source were discharging pollutants; and,

c. any substantial change in volume or character of pollutants being introduced into such treatment works by a source introducing pollutants into such works at the time of issuance of the permit.

Such notice shall include information on the quality and quantity of effluent to be introduced into such treatment works; and an anticipated impact of such change in the quantity or quality of effluent to be discharged from such publicly owned treatment works.

16. The permittee shall require any industrial user of such treatment works to comply with the requirements of section 204(b), 307, and 308 of the Act. For compliance with section 204(b) of the Act, the permittee shall comply with Special Condition #3 of Federal Construction Grant No. C-34-369, and shall establish a system of user charges and industrial cost recovery in accordance with proposed regulations amending 40 CFR, Part 35, published in the Federal Register dated May 22, 1973, or any subsequent revisions.

For compliance with section 307 of the Act, the permittee shall meet the data collection, and other requirements of section C-2, "Schedule of Compliance for Industrial Discharge Information" in this permit.

17. The permittee shall require any industrial user of storm sewers owned by the PVSC to comply with the requirement of section 308 of the Act.

18. The United States Army Corps of Engineers conducts maintenance dredging of navigable waters and their tributaries pursuant to certain federal statutes. The permittee should be aware of its possible responsibilities under the maintenance dredging program. Under these laws, any person, firm or other entity discharging suspended solids into a navigable waterway of the United States, or tributary thereof, which contributes to the necessity for maintenance dredging of that waterway may be required to participate in the maintenance dredging program.

B. REQUIRED EFFLUENT LIMITATIONS AND MONITORING AND OPERATIONAL REQUIREMENTS

1.A. REQUIRED EFFLUENT LIMITATIONS

During the period beginning on the effective date of this permit and lasting until the date of expiration of this permit, discharges shall be limited and monitored by the permittee as specified below:

a. A significant removal of settleable solids shall be achieved.

b. See Table I.

c. The permittee shall act to significantly reduce the concentration of floating solids prior to discharge and, except as specifically authorized in this permit, the permittee shall not discharge visible foam.

d. The effluent values for pH shall remain within the limits of 6.0 to 9.0.

e. From information supplied by the permittee, the design average daily flow of 225 MGD is regularly being exceeded. The preceding effluent limitations will be the determining factors in judging if this facility is adequately treating its wastewater.

1.B. ADDITIONAL EFFLUENT LIMITATION

Starting on May 15. 1975,* the chlorination facilities shall be operated continuously year round. A chlorine residual concentration of not less than 0.5 mg/l shall be maintained in the effluent at all times unless the permittee demonstrates compliance with the following:

The geometric mean of the fecal coliform bacteria values for effluent samples collected in a period of 30 consecutive days shall not exceed 200 per 100 milliliters. The geometric mean of these values for effluent samples collected in a period of seven consecutive days shall not exceed 400 per 100 milliliters.

* Subject to change to an earlier date if so determined by the New Jersey Department of Environmental Protection after conclusion of their administrative hearing procedure presently underway.

KLL006256

2. FACILITY OPERATION AND QUALITY CONTROL

All waste collection, control, treatment and disposal facilities shall be operated in a manner consistent with the following:

a. At all times, all facilities shall be operated as efficiently as possible and in a manner which will minimize upsets and discharges of excessive pollutants.

b. The permittee shall provide an adequate operating staff which is duly qualified to carry out the operation, maintenance and testing functions required to insure compliance with the conditions of this permit.

c. Routine maintenance of treatment facilities that results in degradation of effluent quality shall be scheduled during non-critical water quality periods and shall be carried out in a manner approved by the permitting authority.

d. Under no circumstances shall the permittee allow introduction of the following wastes into the waste treatment system:

aa. Wastes which create a fire or explosion hazard in the treatment works.

bb. Wastes which will cause corrosive structural damage to treatment works.

cc. Solid or viscous substances in amounts which cause obstructions to the flow in sewers or interference with the proper operation of the treatment works.

dd. Wastewaters, at a flow rate and/or pollutant discharge rate which is excessive over relatively short time periods so as to cause a loss of treatment efficiency. This condition does not constitute an exception to condition C-4(A)(1)(2).

3. SELF-MONITORING AND REPORTING REQUIREMENTS

a. The permittee shall effectively monitor the operation and efficiency of all treatment and control facilities and the quantity and quality of the treated discharge. Monitoring data required by this permit shall be summarized on an average calendar month basis. Individual reports are to be submitted on a quarterly basis. Duplicate original copies of the discharge monitoring report form (EPA Form 3320-1), properly completed and signed by the permittee, must be submitted within 28 days after the end of each report period to the

Regional Administrator and the State Agency at the following addresses:

U. S. Environmental Protection Agency
Region II
Status of Compliance Branch
26 Federal Plaza
New York, New York 10007

Director
Division of Water Resources
New Jersey Department of
Environmental Protection
Labor & Industry Building
P. O. Box 1390
Trenton, New Jersey 08625

Quarterly reports will be required for periods beginning on the first day of the first month following the issuance of this permit. The data collected and submitted shall include the following parameters and testing frequencies:

See Table I

Samples and measurements of the effluent taken to achieve compliance with the monitoring requirements specified above shall be taken at the point of combined flow into the outfall sewer.

Samples and measurement of the influent wastewater taken to meet the monitoring requirements specified above shall be taken at the point of plant inflow.

b. Sampling and Analysis Methods

Other measurements of oxygen demand can be substituted for Biochemical Oxygen Demand (BOD) where the permittee can demonstrate long-term correlation of the method with BOD values. Substitution of such measurements must receive prior approval of the permitting authority.

The analytical and sampling methods used shall conform to the latest edition of the reference methods listed below. (These are interim references to be replaced by Sec. 304(g) guidelines when available.) However, different but equivalent methods are allowable if they receive the prior written approval of the permitting authority.

1. STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATERS, 13th edition, 1971, American Public Health Association, New York, New York 10019.

2. A.S.T.M. STANDARDS, PART 23, WATER; ATMOSPHERIC ANALYSIS, 1972, American Society for Testing and Materials, Philadelphia, Pa. 19103.

3. METHODS FOR CHEMICAL ANALYSIS OF WATER AND WASTES, April 1971, U.S. Environmental Protection Agency, Water Quality Office, Analytical Quality Control Laboratory, 1014 Broadway, Cincinnati, Ohio 45202.

The permittee shall periodically calibrate and perform maintenance procedures on all monitoring and analytical instrumentation at intervals to insure accuracy of measurements.

4. RECORDING

The permittee shall record for all samples the date and time of sampling, the sampling method used, the date analyses were performed, the identity of the analysts, and the results of all required analyses and measurements.

All sampling and analytical records mentioned in the preceding paragraph shall be retained for a minimum of three years. The permittee shall also retain all original recordings from any continuous monitoring instrumentation, and any calibration and maintenance records, for a minimum of three years. These periods will be extended during the course of any unresolved litigation, or when so requested by the Regional Administrator.

5. SOLIDS DISPOSAL

Collected screenings, slurries, sludges, and other solids shall be disposed of in such a manner as to prevent entry of those wastes (or runoff from the wastes) into navigable waters or their tributaries.

The permittee shall cooperate with the U.S. Environmental Protection Agency in the development of a sludge management program aimed at eliminating ocean disposal of sludge, and shall cooperate with other operating agencies in exploring solutions to sludge management and disposal problems.

TABLE I

SELF-MONITORING REQUIREMENTS (Discharge 001) 1/

Parameter	Minimum Monitoring Requirements Measurement Frequency	Sample Type
otal Flow, mgd	Continuous	N/A
OD , mg/l	Daily	24-hr composite
OD , lbs/day*	-	-
ttleable Solids, ml/l	6 per day	Grab
uspended Solids, mg/l	Daily	24-hr composite
uspended Solids, lbs/day*	--	-
esidual Chlorine, mg/l 2/	6 per day	Grab
ecal Coliform, N per 100 ml 2/	Daily	Grab
H	6 per day	Grab

/ Except where indicated influent and effluent measurement and testing are required.

2/ Only effluent testing required.

* To be calculated using actual flow and actual testing results for parameters noted.

SECTION C

Special Conditions and Schedules for Compliance with Permit Limitations

Contents

Compliance Reporting Requirements (1)

The Permittee shall comply with the following schedules and shall report to the Regional Administrator and the State Agency within 14 days following each date on the schedules detailing its compliance or non-compliance (2) with the schedule date and requirements.

C-1 Descriptive Listing of Discharge Points

A. Discharge Points Owned by the Permittee

Discharge Serial Number and Receiving Water	Discharge Description and Location (approximate U.S.G.S. Cor.)
#001 Upper New York Bay	Outfall for treated effluent, extends 3200 feet from shore to a depth of 40-60 feet. (40°42'45"N, 74°03'42" W)
#002 Newark Bay	Newark Bay Bypass for treated effluent. (40°42'45N, 74°07'24"W)
#003 Confluence of Third River and Passaic	Yantacaw St. Bypass, Clifton (40°49'17"N, 74°7'53" W)
#004 Confluence of Third River and Passaic River	Yantacaw Pumping Station Overflow, Clifton (40°49'16" N, 74°7'56" W)
#005 Passaic River	Wallington Pump Station Bypass, Wallington (40°51'26" N, 74°7'9"W)
#006 Passaic River	North Arlington Branch Overflow North Arlington (40°47'12"N 74°7'51"W)
#007 Passaic River	Hudson St. Overflow, Paterson (40°55'27" N, 74°10'7" W)

B. Discharge Points Not Owned by the Permittee which work in conjunction with the Permittee's System and which are to be included as part of Section C-4 ,wet weather flow study.

Discharge Serial Number and Receiving Water	Discharge Description and Location (approximate U.S.G.S. Cor.)
#008 Passaic River	East Newark, Central Avenue Overflow (40°35'03" N, 74°09'55" W)
#009 Passaic River	Garfield, Garden State Bypass (40°53'10" N, 74°07'44" W)
#010 Passaic River	New Street, Harrison Overflow (40°44'49"N, 74°09'56" W)
#011 Passaic River	Cleveland Street, Harrison Overflow (40°44'45"N, 74°09'56" W)
#012 Passaic River	Harrison Avenue, Harrison Overflow (40°44'42" N, 74°09'56" W)
#013 Passaic River	Dey Street, Harrison Overflow (40°44'33" N, 74°09'53" W)
#014 Passaic River	Middlesex Street, Harrison Overflow (40°44'33" N, 74°09'53" W)
#015 Passaic River	Bergan Street, Harrison Overflow (40°44'25" N, 74°09'49" W)
#016 Passaic River	Worthington Ave., Harrison Overflow (40°44'21" N, 74008'41" W)
#017 Passaic River	Stewart Ave., Kearny Overflow (40°46'46" N, 74°07'55" W)

#018 Passaic River	Washington Ave., Kearny Overflow (40°46'37" N, 74°08'00" W)
#019 Passaic River	Bergen Ave., Kearny Overflow (40°45'43" N, 74°09'40" W)
#020 Passaic River	Nairn Ave., Kearny Overflow (40°45'33" N, 74°09'46" W)
#021 Passaic River	Marshall Street, Kearny Overflow (40°45'24" N, 74°09'51" W)
#022 Passaic River	Johnston Ave., Kearny Overflow (40°45'16" N, 74°09'52" W)
#023 Franks Creek thence to Passaic River	Ivy Street, Franks Creek Overflow, Kearny (40°45'34" N, 74°08'30" W)
#024 Franks Creek thence to Passaic River	Bergen St., Franks Creek Overflow, Kearny (40°45'09" N, 74°08'14" W)
#025 Franks Creek thence to Passaic River	Tappan St., Franks Creek Overflow, Kearny (40°45'01" N, 74°08'12" W)
#026 Franks Creek, a tributary of the Passaic River	Duke St., Franks Creek Overflow, Kearny (40°44'58" N, 74°08'10" W)
#027 Passaic River	Lodi force main bypass, Passaic (45°51' 25" N, 74°07'13" W)
#028 Passaic River	Verona Ave., Newark Bypass (40°46'35" N, 74°09'07" W)
#029 Passaic River	Delavan Ave., Newark Bypass (40°46'11" N, 74°09'29" W)

#031 Passaic River	Third Ave., Newark Bypass (40°45'28" N, 74°09'55" W)
#032 Passaic River	Fourth Ave., Newark Bypass (40°45'22" N, 74°09'56" W)
#033 Passaic River	Clay Street, Newark Bypass (40°45'03" N, 74°09'58" W)
#034 Passaic River	Orange Street, Newark Bypass (40°44'47" N, 74°10'01" W)
#035 Passaic River	Bridge Street, Newark Bypass (40°44'41" N, 74°10' 00" W)
#036 Passaic River	Rector Street, Newark Bypass (40°44'29" N, 74°09'56" W)
#037 Passaic River	Saybrook Place, Newark Bypass (40°44'26" N, 74°09'44" W)
#038 Passaic River	City Dock, Newark Bypass (40°44'07" N, 74°09'44" W)
#039 Passaic River	Jackson Street, Newark Bypass (40°43'59" N, 74°09'19" W)
#040 Passaic River	Polk Street, Newark Bypass (40°43'59" N, 74°09'14" W)
#041 Passaic River	Freeman Street, Newark Bypass (40°44'02" N, 74°08'46" W)
#042 Passaic River	Curtis Pl., Paterson Overflow (40°55'11" N, 74°10'34" W)
#043 Passaic River	Mulberry St., Paterson Overflow (40°55'12" N, 74°10'33" W)

#044 Passaic River	West Broadway, Paterson Overflow (40°55'14" N, 74°10'31" W)
#045 Passaic River	Bank St., Paterson Overflow (40°55'18" N, 74°10'27" W)
#046 Passaic River	Bridge St., Paterson Overflow (40°55'23" N, 74°10'14" W)
#047 Passaic River	Montgomery St., Paterson Overflow (40°55'29" N, 74°10'03" W)
#048 Passaic River	Straight St., Paterson Overflow (40°55'33" N, 74°09'59" W)
#049 Passaic River	Franklin St., Paterson Overflow (40°55'36" N, 74°09'57" W)
#050 Passaic River	Keene St., Paterson Overflow (40°55'37" N, 74°09'56" W)
#051 Passaic River	Warren St., Paterson Overflow (40°55'40" N, 74°09'55" W)
#052 Passaic River	Sixth Avenue, Paterson Overflow (40°56'03" N, 74°10'01" W)
#053 Passaic River	East 5th St.and Fifth Ave., Paterson Overflow (40°56'11" N, 74°09'48" W)
#054 Passaic River	East 11th St., Paterson Overflow (40°56'13" N, 74°09'26" W)
#055 Passaic River	Fourth Ave., Paterson Overflow (40°56'14" N, 74°09'22" W)

#056 Passaic River	S.U.M. Park, Paterson Overflow (40°55'05" N, 74°10'46" W)
#057 Passaic River	North West St., Paterson Overflow (40°55'17" N, 74°10'33" W)
#058 Passaic River	Arch Street, Paterson Overflow (40°55'24" N, 74°10'14" W)
#059 Passaic River	Jefferson St., Paterson Overflow (40°55'26" N, 74°10'11" W)
#060 Passaic River	Stout St., Paterson Overflow (40°55'29" N, 74°10'09" W)
#061 Passaic River	North Straight St., Paterson Overflow (40°55'35" N, 74°10'00" W)
#062 Passaic River	Bergen St., Paterson Overflow (40°55'44" N, 74°09'57" W)
#063 Passaic River	Short St., Paterson Overflow (40°55'53" N, 74°10'05" W)
#064 Passaic River	Second Ave., Paterson Overflow (40°56'18" N, 74°08'35" W)
#065 Passaic River	Third Ave., Paterson Overflow (40°56'10" N, 74°08'30" W)
#066 Passaic River	33 Street and Tenth Ave., Paterson Overflow (40°55'25" N, 74°08'28" W)
#067 Passaic River	20th Ave., Paterson Overflow (40°54'21" N, 74°07'59" W)
#068 Passaic River	Market Street, Paterson Overflow (40°54'08" N, 74°08'05" W)

#069 Passaic	Passaic Tail Race, Passaic Bypass ($40^{o}51'27"$ N, $74^{o}07'13"$ W)
#070 Passaic River	Dundee Island Lateral, Passaic Overflow ($40^{o}51'52"$ N, $74^{o}06'40"$ W)
#071 Passaic River	Woodward Ave., Rutherford Overflow ($40^{o}49'52"$ N, $74^{o}07'15"$ W)
#072 Passaic River	Pierrepont Ave., Rutherford Overflow ($40^{o}49'40"$ N, $74^{o}07'18"$ W)
#073 Passaic River	Rutherford Ave., Rutherford Overflow ($40^{o}49'20"$ N, $74^{o}07'25"$ W)
#074 Passaic River	Second River Joint Meeting, Neward Bypass ($40^{o}46'36"$ N, $74^{o}09'05"$ W)

Addendum

#030 Passaic River	Herbert Place, New ark Bypass ($40^{o}45'55"$ N, $74^{o}09'35"$ W)

C-2. SCHEDULE OF COMPLIANCE FOR INDUSTRIAL DISCHARGE INFORMATION

It is apparent that other pollutants attributable to inputs from major contributing industries using the municipal system are also present in the facility's discharge. At such time as sufficient information becomes available to establish limitations for such pollutants, this permit may be revised to specify effluent limitations for any or all of such other pollutants in accordance with best practicable industrial technology requirements or water quality standards.

A. Not later than August 31, 1975, the permittee shall initiate whatever actions are needed to enable the permittee to enforce all pre-treatment requirements necessary to insure compliance with the terms and conditions of this permit as well as to insure compliance by all major contributing industries with the pre-treatment standards and any other applicable regulations promulgated pursuant to Sections 307 and 308 of the Act.

By August 31, 1975, the permittee shall notify the Regional Administrator and State Agency of the actions it intends to take to comply with the above requirement.

The permittee shall require each major contributing industry to submit to the permittee periodic notice (at intervals not to exceed 9 months) regarding specific actions taken to achieve full compliance with the requirements of Section 307. On the last day of the months of March and September, the permittee shall submit to the permit issuing authority a report summarizing the progress of all known major contributing industries subject to the requirements of Section 307 towards achieving full compliance with such requirements. Such reports shall include, at least, the following information:

(1) A narrative summary of actions taken by the permittee to develop, promulgate, and enforce its own industrial waste regulations, as well as its own legislation and thereby ensure that all major contributing industries comply with the requirements of Section 307.

(2) The number of major contributing industries using the treatment works, divided into SIC group categories.

(3) The number of major contributing industries known to be in full compliance with the requirements of Section 307, or not subject to these requirements; e.g., discharge only compatible pollutants.

(4) A list identifying by name those major contributing industries known to be presently in violation of the requirements of Section 307.

These semi-annual reports must be filed with the permitting authority by March 31 and September 30 of each year until compliance is achieved. Submission would be required again only if a major contributing industry reverts to violating the requirements of Section 307.

B. Immediately upon issuance of this permit, the permittee shall establish and implement a procedure to obtain from all major contributing industries specific information on the quality and quantity of effluents introduced by such industrial users. The following information shall be reported to the permitting agency on a semi-annual basis beginning March 31, 1975; semi-annual reports reflecting no change from the previous reporting period may simply relate this fact without submitting repetitive data. These reports should follow the format outlined in the Appendix to this compliance schedule. All required data must be submitted before March 31, 1976.

It shall be the responsibility of the Permittee to compute and include in the semi-annual reports the "best practicable" effluent limitations and to determine and implement necessary pre-treatment requirements (as provided for in 40 CFR Part 128) for the major contributing industries. In computing the allowable industrial inputs, the permittee shall utilize the applicable industrial effluent guidelines as published in the Federal Register.* In the first semi-annual report (due March 31, 1975), the permittee shall propose a schedule for determining the required pre-treatment information and, after approval by the permitting authority, shall implement the schedule. After receipt of the pre-treatment data, this permit may be amended to reflect the PVSC'S effluent requirements for incompatible pollutants.

NOTE: A major contributing industry is one that: (a) has a flow of 50,000 gallons or more per average workday; (b) has a flow greater than 5% of the flow carried by the municipal system receiving the waste; (c) has in its waste a toxic pollutant in toxic amounts as defined in standards issued under Section 307 (a) of the Act; or (d) has significant impact, either singly or in combination with other contributing industries, on the treatment works or the quality of its effluent.

* If the permittee is unable to compute effluent limitations for any industrial source category, the permittee shall so notify the permit issuing authority. After such notification, the permit issuing authority will either assume the responsibility for such calculations or will assist the permittee in computing effluent limitations for that industrial source category.

APPENDIX TO INDUSTRIAL COMPLIANCE SCHEDULE

To comply with the industrial discharge reporting requirements outlined above, the following procedure should be utilized for each major contributing industry:

> Using the following format, a description of each major contributing industry discharging to the municipal system should be prepared. A separate set of six questions should be completed for each major industrial user.
>
> See "Section IV" of "Standard Form A" (attached).

It is the responsibility of the permittee to obtain the required information for all major industrial contributors to his facility, including those contributing via another system. Actual data should be provided, if available; otherwise the best estimate should be provided and the response marked "interim." If certain of the requested information does not apply, it should be marked "N.A."

Specific instructions follow: (Question numbers refer to those on the sheet entitled "Standard Form A - Municipal".)

QUESTION 1 - MAJOR CONTRIBUTING FACILITY: - Give the name and address that designates the location of the industrial facility.

QUESTION 2 - PRIMARY STANDARD INDUSTRIAL CLASSIFICATION CODE: - Using four-digit standard industrial classification (SIC) codes, indicate the type of industrial facility that is discharging into the municipal system. Standard industrial classification (SIC) code numbers and descriptions may be found in the 1972 edition of the "Standard Industrial Classification Manual" prepared by the Executive Office of the President, Office of Management and Budget, which is available from the Government Printing Office, Washington, D. C. Do not use previous editions of the manual. Copies are also available for examination at State water pollution control offices, Regional Offices of the U. S. Environmental Protection Agency, and at most public libraries.

QUESTION 3 - PRINCIPAL PRODUCT OR RAW MATERIAL: Specify either the principal product or the principal raw material and the maximum quantity per day produced or consumed. Quantities are to be reported in the units of measurement given in Table B for particular SIC categories. Enter the letter-number code from the "Code" column in Table B for the units selected under "Units." For SIC categories not listed, use the units of measurements normally used by that industry.

QUESTION 6: Indicate the characteristics of the wastewater from the contributing industry in terms of parameters that will adequately identify the waste, such as BOD, COD, Cr, Zn, pH units, degrees Fahrenheit, etc. The characteristics should be indicative of the waste stream after any pre-treatment is provided by the industrial facility but prior to entering the municipal system.

In addition to parameter names, report values in units specified in Table A. The first column, "Parameter & Units," indicates the preferred units for reporting data for a given parameter. The second column, "Method," lists the preferred analytical method, if any, for determining the required parameter values. The next three columns, "References," give the page numbers in standard reference works where a detailed description of the recommended analytical technique given under "Method" can be found. These standard references are:

1. STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATERS, 13th edition, 1971, American Public Health Association, New York, New York 10019.

2. A. S. T. M. STANDARDS, PART 23, WATER; ATMOSPHERIC ANALYSIS, 1972, American Society for Testing and Materials, Philadelphia, Pa. 19103.

3. EPA METHODS FOR CHEMICAL ANALYSIS OF WATER AND WASTES, April 1971, Environmental Protection Agency, Water Quality Office, Analytical Quality Control Laboratory, 1014 Broadway, Cincinnati, Ohio 45202.

Copies of these publications are available from the above sources, or for review in the Regional Offices of the U.S. Environmental Protection Agency or the State Water Control Board.

The last column, "Data Reporting Level," indicates that nearest significant figure (digit) to which the data must be reported. For example, the figure X for chloride indicates that chloride data must be reported to the nearest whole milligram per liter. This level should not be confused with "detectable limits"; applicable detection limit information can be obtained from the appropriate reference source.

Additional information obtained through the permittee's "Waste Effluent Survey" description shall be submitted for each major industry. Such additional information should include:

(1) A brief description of industrial operations.

(2) The quantity of water used by the industry for the preceding year, classified according to source; i.e., purchased water, well water, river water.

(3) A description of the date and timespan of samples reported in answer to Question number 6 of "Section IV."

(4) A description of the industry's flow variation, including hours of discharge and maximum, minimum and average flow rates.

FOR AGENCY USE

STANDARD FORM A—MUNICIPAL

SECTION IV. INDUSTRIAL WASTE CONTRIBUTION TO MUNICIPAL SYSTEM Page of

Submit a description of each major industrial facility discharging to the municipal system, using a separate Section IV for each facility description. Indicate the 4 digit Standard Industrial Classification (SIC) Code for the industry, the major product or raw material, the flow (in thousand gallons per day), and the characteristics of the wastewater discharged from the industrial facility into the municipal system. Consult Table III for standard measures of products or raw materials. (see instructions)

1. Major Contributing Facility (see instructions)
   - Name 401a ____________
   - Number & Street 401b ____________
   - City 401c ____________
   - County 401d ____________
   - State 401e ____________
   - Zip Code 401f ____________
2. Primary Standard Industrial Classification Code (see instructions) 402 ____________
3. Principal Product or Raw Material (see instructions)

			Quantity		Units (See Table III)
Product	403a ____________	403c	____________	403e	____________
Raw Material	403b ____________	403d	____________	403f	____________

4. Flow Indicate the volume of water discharged into the municipal system in thousand gallons per day and whether this discharge is intermittent or continuous.
   - 404a ____________ thousand gallons per day
   - 404b ☐ Intermittent (int) ☐ Continuous (con)
5. Pretreatment Provided Indicate if pretreatment is provided prior to entering the municipal system 405 ☐ Yes ☐ No
6. Characteristics of Wastewater (see instructions)

406a	Parameter Name							
	Parameter Number							
406b	Value							

KLL006274

C-3. SEWER SYSTEM EVALUATION AND REHABILITATION COMPLIANCE SCHEDULE

A. The permittee has, in accordance with 40 CFR 35.927, initiated a Sewer System Evaluation and Rehabilitation Program. The permittee shall, by August 31, 1976, submit to both the Regional Administrator and the NJDEP the results of Phase I (Infiltration/Inflow Analysis) of this program.

B. If it is determined by the results obtained from the Infiltration/Inflow Analysis that the Sewer System Evaluation and Rehabilitation Program is to continue, the permittee shall, within one month of approval of the Analysis (Phase I) Report by the USEPA and the NJDEP, submit a program for Phase II (Field Investigation and Survey), together with a proposed Engineering Contract for said work and an application for a Federal grant for this work. Within two months of approval by the USEPA of this program, contract and a grant, the permittee shall execute the contract and start Phase II of the program.

C. Upon completion by the permittee of Phase II of the Sewer System Evaluation and Rehabilitation Program and after approval by the Regional Administrator and the NJDEP of the results of Phase II, this permit may be revised to incorporate a compliance schedule for construction or rehabilitation (Phase III) recommended by Phase II.

C-4. WET WEATHER FLOW STUDY COMPLIANCE SCHEDULE

A. Operation of Systems with Combined Sewers

i. General Requirements

1. The permittee shall operate the treatment works, including the treatment plant and total sewer system, to minimize discharge of the pollutants listed in the permit from combined sewer overflows or bypasses.

2. No new sources of stormwater inflow shall be connected to any separate sanitary sewers in the sewer system.

ii. Preliminary Requirements

1. Report on Maximum Treatable Flow Rates

The permittee must report to the Regional Administrator and the State agency by August 31, 1975, the maximum treatable flow rates for the treatment plant or any complete unit process. The maximum treatable flow rates must be at least equal to one of the following:

a. The maximum hydraulic flow rate for which the treatment plant was designed, or the maximum hydraulic flow rate for which the treatment plant can provide partial treatment.

b. The maximum flow rate that can be delivered to the plant without causing seriously adverse conditions, such as substantial property damage, in the interceptor and lateral sewer system.

The permittee shall operate the system so as to achieve the maximum treatable flow.

2. In lieu of the above, The permittee may submit a detailed operational plan designed to minimize pollutant discharges from the treatment and sewer system. The permittee must demonstrate that, if implemented, the plan would provide for a lower discharge of pollutants from the system during wet weather than that occurring if the hydraulic flow were treated during wet weather at the limiting flow rate in B. 1. above. The treatment plant and sewer system shall be operated in accordance with this plan.

3. The permittee shall also report by February 28, 1977, to the permit issuance authority a proposed method for estimating the number and location of new sewer connections which will be served by combined sewers for the duration of the permit. The permittee shall also report by February 28, 1979, a proposed method for estimating the impact of the additional flows generated by these new sewer connections on the volume of discharges from the combined sewer system. This method shall be used in the development of the operational plan required in Section iii, below.

iii. Operational Plan

An interim operational plan designed to minimize the discharge of pollutants from combined sewer overflows and bypasses must be submitted by the permittee to the Regional Administrator and the State Agency by June 30, 1976. The plan will provide for optimal coordinated operation of the sewage treatment plant and contributing sewer systems. The plan will specifically:

1. Refine the estimate of maximum treatable flow.

2. If applicable, report the number, location, types, and kinds of regulators and their respective operating history, maintenance program, and performance efficiency.

3. Report the calculated or estimated storage capacities of the sewer system upstream from all control devices such as pump stations and regulators, or combined sewer discharges.

4. Provide operational procedures for utilizing at least 80% of the available capacity of interceptors and trunk lines upstream of any control devices such as pump stations, or regulators prior to any discharge from a combined sewer overflow or bypass; or provide, if such storage capacity utilization cannot be achieved with existing control devices, the operational procedures for maximizing the use of storage prior to any combined sewer discharge.

5. Provide a method to determine if the upstream storage capacity was utilized prior to any discharge from the combined sewer system.

3. The permittee shall also report by February 28, 1976, to the permit issuance authority a proposed method for estimating the number and location of new sewer connections which will be served by combined sewers for the duration of the permit, and a proposed method for estimating the impact of the additional flows generated by these new sewer connections on the volume of discharges from the combined sewer system. This method shall be used in the development of the operational plan required in Section iii, below.

SUPERCEDED
INSERTION
see revision

iii. Operational Plan

An interim operational plan designed to minimize the discharge of pollutants from combined sewer overflows and bypasses must be submitted by the permittee to the Regional Administrator and the State agency by June 30, 1976. The plan will provide for optimal coordinated operation of the sewage treatment plant and contributing sewer systems. The plan will specifically:

1. Refine the estimate of maximum treatable flow.

2. If applicable, report the number, location, types, and kinds of regulators and their respective operating history, maintenance program, and performance efficiency.

3. Report the calculated or estimated storage capacities of the sewer system upstream from all control devices such as pump stations and regulators, or combined sewer discharges.

4. Provide operational procedures for utilizing at least 80% of the available capacity of interceptors and trunk lines upstream of any control devices such as pump stations, or regulators prior to any discharge from a combined sewer overflow or bypass; or provide, if such storage capacity utilization cannot be achieved with existing control devices, the operational procedures for maximizing the use of storage prior to any combined sewer discharge.

5. Provide a method to determine if the upstream storage capacity was utilized prior to any discharge from the combined sewer system.

6. Analyze the effect on the total volume of combined sewer discharges of new sewer connections anticipated for the duration of the permit. If these additional connections are expected to increase the total volume of discharges for like meteorological conditions, the plan must provide a method for the prevention of this increase by regulation or control of new connections and/or an offsetting of any added flows by such means as sewage and inflow reduction, in-system flow routing, and treatment and enlargement of sewer and treatment capacity.

B. Monitoring of Systems with Combined Sewers

i. General Requirements

Point sources so noted in Section C-1, are overflows resulting when the hydraulic flow capacity of the system has been exceeded.

These discharge points may be utilized for wet weather overflows or bypasses to the extent specified by the approved preliminary report and interim operational plan. For all overflows the permittee is required to take the following actions:

In conjunction with the permittee's Infiltration/Inflow Analysis the permittee shall take measurements at overflow stations and at bypass points to determine overflows due to both infiltration and inflow. Such overflows shall be related to rainfall wherever possible, and time-duration curves shall be developed to establish both peak rates and total quantity overflowed insofar as may be possible. Sampling of such overflows shall be undertaken to determine the quality of the bypassed storm water flows and its effect on the River. The results of such analyses shall be included in the report required August 31, 1976.
(see Condition C-3(A) on Infiltration/Inflow Analysis).

ii. Reporting Results

Included in the report required above, or in a separate report to be submitted by June 30, 1977, the permittee shall make recommendations concerning the alternative plans for corrective action along with recommendations for alleviating and/or treating overflow discharges including estimates of cost for implementing the alternative plans. The alternative strategies to be evaluated shall include, as a minimum:

a. dual use treatment facilities;

b. storing and/or treating initial or final sewer system flushes;

c. storage and subsequent treatment of discharges;

d. improvements in the sewer system.

C-5 FACILITIES UPGRADING COMPLIANCE SCHEDULE

A. The permittee shall, before August 1, 1976, complete and submit to both the Regional Administrator and the State Agency, a detailed design report and plans and specifications, together with a Step 3 Grant Application, for the Phase I* modifications to the treatment facilities. 3/ Within one year after approval by the USEPA and the NJSDEP of Phase I, the permittee shall submit a detailed design report and plans and specifications for Phase II* modifications to the treatment facilities. 3/

B. Construction grant project number C-34-369-02, contracts numbered 480, 481, 484, 485, 487, 494, 491, 496A and 496B, is expected to be certified to the USEPA by the NJSDEP in a short time. Upon being awarded the Federal grant, the PVSC must advertise for receipt of bids in a timely manner. The following schedule shall be followed: one or more contracts must be advertised for bids within three months after receipt of the Federal grant. All nine contracts must be advertised for bids within seven months after receipt of the Federal grant.

Upon receipt by the USEPA of additional NJSDEP certified construction grant applications for completion of the facility upgrading, this permit shall be revised to include the appropriate schedules for advertising the remaining contracts.

*Facilities upgrading to be accomplished in two major construction phases. Phase I involved construction of new secondary settling facilities, biological units, pumping stations, maintenance building, etc., and the major part of the sludge handling facilities. Phase II involves the demolition of existing primary settling facilities and the construction of new primary settling facilities and the remaining sludge handling facilities.

NOTES:

1/ If the time period allotted for the completion of an interim requirement specified above is greater than 9 months, then the permittee shall submit a report detailing its progress toward completion of the interim requirement at the end of the first 9-month period and at the end of each succeeding 9-month period (including, of course, the report, specified above, required within 14 days following the specified completion date).

2/ Each notice of non-compliance shall include the following information:

A. a short description of the non-compliance;

B. a description of any actions taken or proposed to be taken by the permittee to comply with the elapsed schedule requirement without further delay;

C-5. FACILITIES UPGRADING COMPLIANCE SCHEDULE

SUPERCEDED see revision

A. The permittee shall, before February 28, 1976, complete and submit to ~~both the~~ Regional Administrator and the State agency, a detailed design report and plans and specifications, together with a Step 3 Grant Application, for the Phase I* modifications to the treatment facilities. 3/ Within one year after approval by the USEPA and the NJDEP of Phase I, the permittee shall submit a detailed design report and plans and specifications for Phase II* modifications to the treatment facilities. 3/

B. The permittee shall, within two months after receiving an offer of a grant from USEPA and approval from both the Regional Administrator and the State agency of the documents required above, advertise for the receipt of bids, in accordance with the detailed schedule submitted with the Step 3 grant application, approved by the USEPA. Within one month after approval by USEPA and NJDEP of bids received, the permittee shall award the construction contracts for the approved work.

*Facilities upgrading to be accomplished in two major construction phases. Phase I involved construction of new secondary settling facilities, biological units, pumping stations, maintenance building, etc., and the major part of the sludge handling facilities. Phase II involves the demolition of existing primary settling facilities and the construction of new primary settling facilities and the remaining sludge handling facilities.

NOTES:

1/ If the time period allotted for the completion of an interim requirement specified above is greater than 9 months, then the permittee shall submit a report detailing its progress toward completion of the interim requirement at the end of the first 9-month period and at the end of each succeeding 9-month period (including, of course, the report, specified above, required within 14 days following the specified completion date).

2/ Each notice of non-compliance shall include the following information:

A. a short description of the non-compliance;

B. a description of any actions taken or proposed to be taken by the permittee to comply with the elapsed schedule requirement without further delay;

C. a description of any factors which tend to explain or mitigate the non-compliance; and,

D. an estimate of the date permittee will comply with the elapsed schedule requirement and an assessment of the probability that permittee will meet the next schedule requirement on time.

3/ It is recognized that sufficient flexibility must be maintained so that modifications to design parameters, necessitated by the results of the sewer system evaluation and wet weather study, may be made.

This permit shall become effective on February 28, 1975.

This permit and the authorization to discharge shall be binding upon the permittee and any successors in interest of the permittee and shall expire on June 30, 1977. The permittee shall not discharge after the above date of expiration. In order to receive authorization to discharge beyond the above date of expiration, the permittee shall submit such information, forms, and fees as are required by the agency authorized to issue NPDES permits no later than December 31, 1976.

By authority of Gerald M. Hansler, P. E.
(Regional Administrator)

JAN 20 1975
Date

Meyer Scolnick

Meyer Scolnick, Director
Enforcement and Regional
Counsel Division

ATTACHMENT 26


39
Pabst Site
Sanitary Sewer Line from Pabst Site
"Pabst pvt line 24" "
"Pabst pvt line 24" "
VAILSBURG PARK
BRADLEY COURT
PROJECT NJ 28072
TOWN OF IRVINGTON
CITY OF EAST ORANGE
MELROSE AVE
VERMONT
ISABELLA
COLUMBIA
SO. MUNN
GRAND
CEDAR
CHELSEA
NO. MUNN
MARTENS AVE
MAYBAUM AVE
ORATON PARKWAY
GARDEN STATE PARKWAY
SPEEDWAY AVE
GLADSTONE
WHITNEY ST
SO. GROVE ST
NO. GROVE
SO. 20TH
21ST ST
CITY OF NEWARK
DEPARTMENT OF PUBLIC WORKS
SCALE 1" 200'
DRAWN BY JHE
CHECKED BY
DESIGNING ENGINEER
ENGINEER
CHIEF ENGINEER
DRAWING NO. 39


TOWN OF IRVINGTON
CITY OF EAST ORANGE
FAIRMOUNT CEMETERY
"Pabst pvt line 24" "
Sanitary Sewer Line from Pabst Site (cont.)
Connection between Pabst private 24" line and PVSC Combined Sewer line
PVSC Combined Sewer Line
SO 20TH ST
SO 19TH
SO 18TH
SO 17TH ST
SO 16TH ST
SO 15TH ST
SO 14TH ST
SO 13TH
SO 12TH
SO 11TH
SO 10TH
SO 9TH
SO 8TH
SO 7TH
ASHLAND ST
SOUTH ORANGE AVE
16TH
15TH
14TH
13TH
12TH
11TH
CENTRAL
39
12
10
6
CITY OF NEWARK
DEPARTMENT OF PUBLIC WORKS
SCALE: 1"=200'
DATE:
DESIGNING ENGINEER
DRAWN BY J.H.E.
CHECKED BY
ENGINEER
CHIEF ENGINEER
DRAWING NO.
9

LPRSA0010920


PVSC Combined Sewer Line (cont.)
BRANCH BROOK PARK
MORRIS AV
CITY RAILWAY
DURYEE ST
HECKER ST
HUDSON ST
JAY ST
NORFOLK ST
NEWARK ST
DEY ST
LOCK ST
HOYT ST
SHEFFIELD
COLDEN ST
BOYDEN
SUSSEX
DICKERSON
NESBITT ST
JAMES ST
M. BAXTER TERRACE PROJECT NJ 2-5
ORANGE ST
LACKAWANNA AVE
CLIFTON AVE
8TH
7TH
MT PROSPECT AVE
GARSIDE ST
FACTORY ST
AMITY P.
CUTLER ST
WOOD ST
CRANE
6TH
STONE ST
SUMMER AVE
PARKER
RIDGE
AVE E
LAKE ST
HIGHLAND AVE
PARK AVE
BLOOMFIELD AVE
4TH AVE E
KEARNEY ST
TAYLOR ST
3RD
MILLBROOK
CITY OF NEWARK
DEPARTMENT OF PUBLIC WORKS
SCALE 1"=200'
DRAWN BY J.H.E.
CHECKED BY
DESIGNING ENGINEER
ENGINEER
CHIEF ENGINEER
DATE
DRAWING NO.
7

8
PVSC Combined Sewer Line (cont.)
Outfall to Passaic River
PASSAIC
RIVER
BROAD ST
BROADWAY
MT PLEASANT
HIGH ST
SUMMER AVE
WASHINGTON PARK
HIGHWAY
ROUTE 21
CITY OF NEWARK
DEPARTMENT OF PUBLIC WORKS
SCALE: 1"= 200'
DRAWN BY J.H.E.
CHECKED BY
DESIGNING ENGINEER
ENGINEER
CHIEF ENGINEER
DRAWING NO.
8

Approximate Location of Pabst Milwaukee Beer Depot
WOODLAND CEMETERY
BALDWIN AVE
TREACY AVE
FARLEY AVE
SEYMOUR AVE
CHADWICK AVE
BERGEN
HUNTERDON
PESHINE AVE
JELLIFF
BADGER AVE
RIDGE WOOD AVE
BELMONT
HILLSIDE AVE
LIVINGSTON
HILLSIDE PL
CHARLTON
ROSE ST
WINANS
WAVERLY
MAGNOLIA
FAIRVIEW AVE
LILLIE
BOYD
FELIX FULD COURT
PROJECT NJ 2-8
NJ. 2-12
PROJECT
SO 7TH ST
JACOB ST
SO 6TH ST
LITTLETON AVE
FAIRMOUNT AVE
CAMDEN ST
HIGHLAND ST
SPRINGFIELD AVE
BREMNER ST
18TH
17TH
16TH
SPRUCE
MONTGOMERY ST
W. KINNEY ST
W. ALPINE
MADISON
AVON
CLINTON
CLINTON AVE
ROSE TERR
MORRIS AVE
12
14
16
17
10
CITY OF NEWARK
DEPARTMENT OF PUBLIC WORKS
SCALE: 1" = 200'
DATE
DRAWN BY J.H.E
CHECKED BY
DESIGNING ENGINEER
ENGINEER
CHIEF ENGINEER
DRAWING NO. 13

ATTACHMENT 27

<u>AFFIDAVIT OF SEYMOUR A. LUBETKIN</u>

STATE OF FLORIDA §
COUNTY OF Palm Beach §
§

Seymour A. Lubetkin, having been duly sworn, affirms:

1. I, Seymour A. Lubetkin, was the Chief Engineer of the Passaic Valley Sewerage Commissioners ("PVSC") between 1954 and 1978. I have personal knowledge of the matters discussed in this Affidavit.

2. **Education and Employment**: I hold a Master of Civil Engineering (1957) and a Master of Science in Electrical Engineering (1950). I received a Bachelor of Science in Mechanical Engineering in 1947. I am a member of Tau Beta Pi, the national honorary engineering society, and a Diplomate to the American Academy of Environmental Engineers. I received the Dr. H. Heukelekian Industrial Waste Award from the New Jersey State and Federal Water Pollution Control Association in 1973, and the William D. Hatfield Award for Outstanding Performance in the Operation, Management and Advancement of Knowledge in the field of Water Pollution Control in 1983. I am listed in <u>Who's Who in Engineering</u>. I have served as an arbitrator for the New York Stock Exchange.

3. In 1950, I was employed as Assistant Chief Engineer of the PVSC. In 1954, I was promoted to the position of Chief Engineer, which I held until 1978. As Chief Engineer, I directed all operations of the PVSC, the largest sewerage authority in New Jersey. I was responsible for the annual operating budget of the PVSC, of almost $9 Million, as well as the PVSC's purchasing, investments, and accounting procedures. I directed the activities of the PVSC's more than 200 employees, including the Operating, Engineering, Inspection and Maintenance Personnel (which included the Bypass Crews).. I established pollution control programs involving industrial permits, sewer use ordinances, river and industrial monitoring and pretreatment systems. I wrote the PVSC annual reports and testified as an expert on pollution and the solutions to the problems it causes.

4. I am currently a consulting engineer. I am the author of several articles, in addition to the Annual Reports to the Passaic Valley Sewerage Commissioners for the Years 1971, 1972, 1973, 1974, 1975 and 1976 ("Annual Reports").

5. **Bypassing:** Some of the municipalities discharging into the PVSC system had combined sewers. Because the capacity of the PVSC's treatment plant and trunk line was not sufficient to handle all the waste together with rain water generated in times of peak flow, between 1950 and 1978 the PVSC periodically discharged untreated sewage, including industrial waste streams, directly to the Passaic River. Therefore, the untreated waste of every municipality, including industries, connected to a municipal sewer line served by the PVSC between 1950 and 1978 was diverted to the Passaic River on a periodic basis. The practice of diverting sewage directly to the River was called "bypassing."

6. Because the capacity of the trunk line did not change materially, I believe that PVSC continued to bypass untreated waste to the Passaic River after 1978.

7. **PVSC's Trunk Line:** Before 1902 when the PVSC became a legal entity, most municipality within the PVSC's jurisdiction developed a sewer system which discharged directly to the Passaic River through a discharge line ending in an outfall on or near the River's banks. Between 1912 and 1924, the PVSC constructed a trunk line which runs approximately along the River and intersected the discharge lines of the municipal lines close to the municipal outfalls along the River. In 1924 the PVSC went into operation and collected the waste, formerly being discharged to the Passaic River, into its trunk line. This trunk line carried the waste from the municipal lines directly to the PVSC's treatment plant at Newark Bay near the mouth of the Passaic River.

8. Some of the sewer lines connected to the PVSC's trunk line were combined sewer systems. In these combined sewer systems, stormwater runoff flowed directly into the municipal sewer lines along with wastewater. When it rained, the volume transported by these combined sewer systems into the PVSC's trunk line would increase dramatically. These increases in the

volume handled by the trunk line often exceeded the capacity of the treatment system and the trunk line to handle the waste material. Unless the waste was bypassed to the River, the sewage in the trunk line would back up into the municipal lines and overflow into points connected to the system, including homes.

9. **Outfalls**: Attached to this Affidavit as Exhibit A is a copy of the first National Pollutant Discharge Elimination System ("NPDES") permit issued to the PVSC. The permit, No. NJ0021016 issued effective February 28, 1975, lists the outfalls from the municipal systems handled by the PVSC. Page 13 of the permit lists the discharge points to the Passaic River owned by the PVSC. Outfalls there numbered 001 and 002 were to handle only treated effluent from the PVSC's treatment plant. The remaining outfalls listed there, numbered 003 to 007, inclusive, carried untreated sewage upstream of the PVSC's treatment plant. The PVSC used these outfalls to bypass sewage and rainwater to the River.

10. The permit, at pages 14 through 19, lists an additional 67 outfalls that carried untreated sewage. The PVSC used these outfalls to bypass sewage and rainwater to the Passaic River or its immediate tributaries.

11. The outfall listed in the 1975 NPDES Permit on page 13 and there numbered 003 was also known as the Yantacaw Street Bypass. This bypass carried all the effluent handled by the PVSC upstream of the junction of the Third River and the Passaic River. This outfall was the largest bypass in the system.

12. The outfall listed in the 1975 NPDES Permit on page 19 and there numbered 074 was also known as the Second River Joint Meeting Sewer. The Second River Joint Meeting Sewer was a mini-trunk line, built by the Second River municipalities, Montclair, Glenridge, Bloomfield and part of Nutley. It connected all of their sewage systems to the PVSC's trunk line. When this Second River Joint Meeting Sewer was bypassed to the River, all of the waste handled by these municipal systems went directly into the River.

13. **Mechanics**: In most instances, the PVSC's trunk line ran below the municipal sewer outfall line. The municipal outfall line was connected to the PVSC's trunk line through a chamber constructed so that gravity would carry waste headed down the municipal line into the trunk line and to the PVSC's treatment plant instead of to the River. However, the remainder of the old municipal line was usually kept as a bypass, if needed. In many places float operated valves were constructed to automatically operate the bypasses during high sewer levels.

14. When I was first employed by the PVSC, most of these connections had inoperable automatic bypass valves. These automatic bypass valves were supposed to have been controlled by the float. As the trunk line became full, the float was supposed to rise in the chamber and, in theory, close a valve on the connection between the municipal sewer and the trunk line.. Once this valve was closed, the waste would flow directly along the old outfall directly into the Passaic River. However dirt, rags and sand continually got under the floats keeping them from opening the valves when the sewage level dropped causing by-passing during periods when it was not necessary. Constant maintenance was not sufficient to rectify the problem.

15. Because these automatic bypasses did not operate properly, the floats were disconnected and the flap valve which they formerly controlled was then operated manually with a chain. Thus no bypassing would occur unless it was done manually, or unless the sewage level became so high that it overflowed an adjustable level weir.

16. On the east side of the River, many of the bypass valves were simple weirs. In these weirs, the sewage would fall into the trunk line until the capacity of the trunk line was so full that it backed up to the top of the weir, and then it would overflow the weir directly into the River.

17. The largest bypass, the Yantacaw Bypass had two sets of gates operated by hoists -- one set in the trunk line and one set on the outfall to the Passaic River. Normally, the gate to the trunk line was open and the gate to the Passaic River outfall was closed. To bypass

the trunk line, the Bypass Crew opened the gate to the River and closed the gate to the trunk line. This bypassed all of the sewage in the trunk line upstream of Third River. The second largest line bypass, the Second River Joint Meeting Sewer, similarly had two sets of gates that were operated with hoists. This one bypassed all the sewage in the Joint Meeting Sewer.

18. **Incidents Requiring Bypasses**: The PVSC bypassed waste to the River in the following instances:

a. when it rained and the volume of flow in the system threatened to exceed capacity;

b. when it was necessary to reduce the flow in order to repair sewer lines;

c. when discharges occurred accidentally, as when the flap valve closed because the chain had broken or come unattached; and

d. when a breakdown occurred at the pumping station or treatment plant and it was necessary to limit flow for repairs or to prevent further damage during repairs.

19. **Rain**: Where the rain increased the volume of flow in the trunk line, the PVSC would bypass waste directly to the River in varying quantities in order to control the flow of waste in the trunk line and at the treatment plant. As Chief Engineer, I was in charge of directing the Bypass Crew operations. The Bypass Crew was on call 24 hours a day.

20. Only the amount of waste necessary to protect the system was bypassed. The smaller bypasses in the City of Newark were usually employed first. The Second River Meeting Sewer was the "next-to-the-last resort." This line was easy to bypass because the gates were in the line maintenance yard at Second River owned by the PVSC so they were readily accessible to PVSC personnel. Finally, the "last resort" was the Yantacaw Bypass. Bypassing this system as referred to as "having to throw Yantacaw," as in "the rain was so bad we had to throw Yantacaw."

21. As I discuss in greater detail below, the PVSC kept accurate records of the amount of waste bypassed to the River. I have not reviewed those records in preparing this Affidavit. I have, however, reviewed the charts showing rainfall, River flow and input to the PVSC treatment plant contained in the Annual Reports for the Years 1972, 1973, 1974, 1975 and 1976. I have attached these charts to this Affidavit as Exhibit B-1 through B-10. These charts illustrate that on several occasions each year, the River flow rose significantly, but the volume received at the treatment plant fell below the average daily flow for the year. I believe that in these instances the Yantacaw Street Bypass was thrown, and the waste it carried was bypassed to the River.

22. **Repairs**: The PVSC also bypassed sewage into the Passaic River to repair the sewage lines. For example, as reported at page 55 of the Annual Report for the Year 1971, floods in August of 1971 broke the Second River Joint Meeting Sewer. A 400-foot section of the Second River Joint Meeting Sewer had to be replaced because of this break. However, because of the break, approximately 40 million gallons of waste was discharged to the river from the Second River Joint Meeting Sewer per day between August 28 to September 3, 1971. A large amount of sewage was also bypassed to the Passaic River during the repair of a major crack in the trunk line under McCarter Highway during the month of March 1974. Details of this repair and its problems are presented on page 21 of the 1974 Annual Report.

23. **Records**: The PVSC maintained accurate records of the number of bypasses and the estimated volume of bypassed material. The PVSC used these records to calculate the fees to be charged to the municipalities using the PVSC's system.

24. Each municipality using the PVSC's facilities paid a percentage of the operating expenses of the PVSC. The percentage was based on the ratio between the volume of the municipality's waste and the total waste handled by the PVSC.

25. The volume of waste contributed by each municipality was measured by flow meters. Some by direct measurement as the waste went into the PVSC line and some, such as

Newark, indirectly by subtraction of meters in and along the trunk line. The billable flow for each municipality was calculated weekly using readings from these flow meters along the trunk line. Subtracting the volume of an upstream meter from a downstream meter gave the volume received by the trunk line between those meters. Each municipality paid for its percentage contribution of the total sewage contributed to the PVSC system.

26. If the flow was bypassed to the River because of high volume in the trunk line between two meters, the flow metered in the bypassed area would be reduced. This reduced flow would result in a lower billing ratio for the municipality in the by passed area. This lower billing ratio would confer an unjustified economic benefit on the affected municipality.

27. To correct for this unjustified benefit, a formula was developed that computed a weighted average flow for use during periods when bypasses artificially reduced actual flow. Under this formula, the PVSC calculated an average flow for each municipality based on flow rates during periods when no waste was bypassed. This average flow rate was used to calculate the amount of sewage bypassed in some areas. In other areas the flow charts were modified to add back the estimated amount bypassed. These calculated and estimated flows were added to the municipality whose flow was affected by the bypassing. Using these flows a percentage was calculated for billing purposes and used instead of the unfair results if this was not done.

28. The PVSC kept records of when waste was bypassed so that it could determine when the flow in any municipality had been artificially reduced. These records showed the bypass used, and the amount of time the bypass was open.

29. **What Waste Was Bypassed**: I have not reviewed PVSC's records of the volumes of waste bypassed in preparing this Affidavit. Except as I have expressly stated, I have not estimated the volume of waste bypassed. However, the practice of bypassing was so necessary and frequent that I conclude that the wastestream of every entity connected to a municipal sewer system serviced by the PVSC was bypassed untreated to the Passaic River at some time or another.

30. The various waste sources commingled in the various municipal sewers and these combined wastes commingled in the trunk line. If a main bypass, such as Yantacaw or Second River was opened, all the waste upstream from that point went into the River. Thus when Yantacaw was opened, the waste from Paterson, Passaic, Clifton, Garfield and many other municipalities upstream of Third River, went into the River. When Second River was bypassed the sewage from Monclair, Orange, Glen Ridge, Bloomfield, and East Orange went to the River. Other bypasses discharged waste from various sections of municipalities. Therefore, opening a bypass in Newark bypassed waste from all tributary industries located in that section.

31. Except as expressly noted here, I have not had an opportunity to review records to identify the entities, especially industry, connected to the municipal sewer systems serviced by the PVSC whose waste was bypassed untreated to the Passaic River.

32. The Annual Reports for the years 1971, 1972, 1973, 1974, 1975 and 1976 contain discussion of discharges to the Passaic River that were found to be polluting. These discharges are identified in the Reports by the name and address of the generator. These are in addition to the bypass discharges discussed in this affidavit. For example, the Annual Report for the Year 1971 at page 118 mentions a green florescent dye discharged into the storm sewer from Thomasset Colors at 120 Lister Avenue in Newark. Most of the parties identified in these Annual Reports, like Thomasset Colors, were also connected municipal sewer systems serviced by the PVSC but may have had direct lines to the River or to a storm sewer. Although these lines were only to be used for clean water discharges , waste discharges did occur.

33. In addition, in 1972, the PVSC conducted an Industrial Waste Survey of industries within its service area. I have attached to this Affidavit as Exhibit C a copy of the letter and questionnaire that was sent to approximately 3000 industries by the PVSC in 1972. By the time I wrote the Annual Report to the Commissioners for 1972, 277 industries had completed and returned these questionnaires. The PVSC subsequently sent and received more completed questionnaires. These completed questionnaires identify industries whose waste was

discharged into municipal systems serviced by PVSC and whose waste is sometimes bypassed to the Passaic River as a result of the practice I have described in this Affidavit.

Seymour A. Lubetkin

Seymour A. Lubetkin

STATE OF FLORIDA §
§
COUNTY OF Palm Bch Cty §

Before me, Seymour A. Lubetkin, a notary public, on this day personally appeared Seymour A. Lubetkin, known to me (or proved to me on the oath of Seymour A. Lubetkin) to be the person whose name is subscribed to the foregoing instrument and acknowledged to me that he executed the same for the purposes and consideration therein expressed.

Given under my hand and seal of office this 6th day of January, 1994.

Sharon L. Mollenhauer

Notary Public

SHARON L. MOLLENHAUER
MY COMMISSION # CC 297891
EXPIRES: June 28, 1997
Bonded Thru Notary Public Underwriters

NOTARY ACKNOWLEDGEMENT

STATE OF Florida
COUNTY OF Palm Bch. Cty.

The foregoing instrument, Affidavit By Seymour A Lubetkin was acknowledged before me this 6th day of January 1994 by Seymour A. Lubetkin

[ ] Who is personally known to me or

[X] Who has produced Drivers License L132-784-23-105 Sept4 as identification, a

who [ ] did [✓] did not take an oath,

Sharon L. Mollenhauer
Acknowledger (Signature)

Sharon L. Mollenhauer
Acknowledger (Printed)

Title: SSA

KLLC07278

ATTACHMENT 28

REPORT UPON

OVERFLOW ANALYSIS

TO

PASSAIC VALLEY SEWERAGE COMMISSIONERS

PASSAIC RIVER OVERFLOWS

CLAY STREET, NEWARK
NPDES. NO.033/N-006

1976

ELSON T. KILLAM ASSOCIATES, INC.
Environmental and Hydraulic Engineers
48 ESSEX STREET MILLBURN NEW JERSEY

PASSAIC VALLEY SEWERAGE COMMISSIONERS

PASSAIC RIVER OVERFLOWS

CLAY STREET, NEWARK
NPDES NO. 033/N-006

TABLE OF CONTENTS

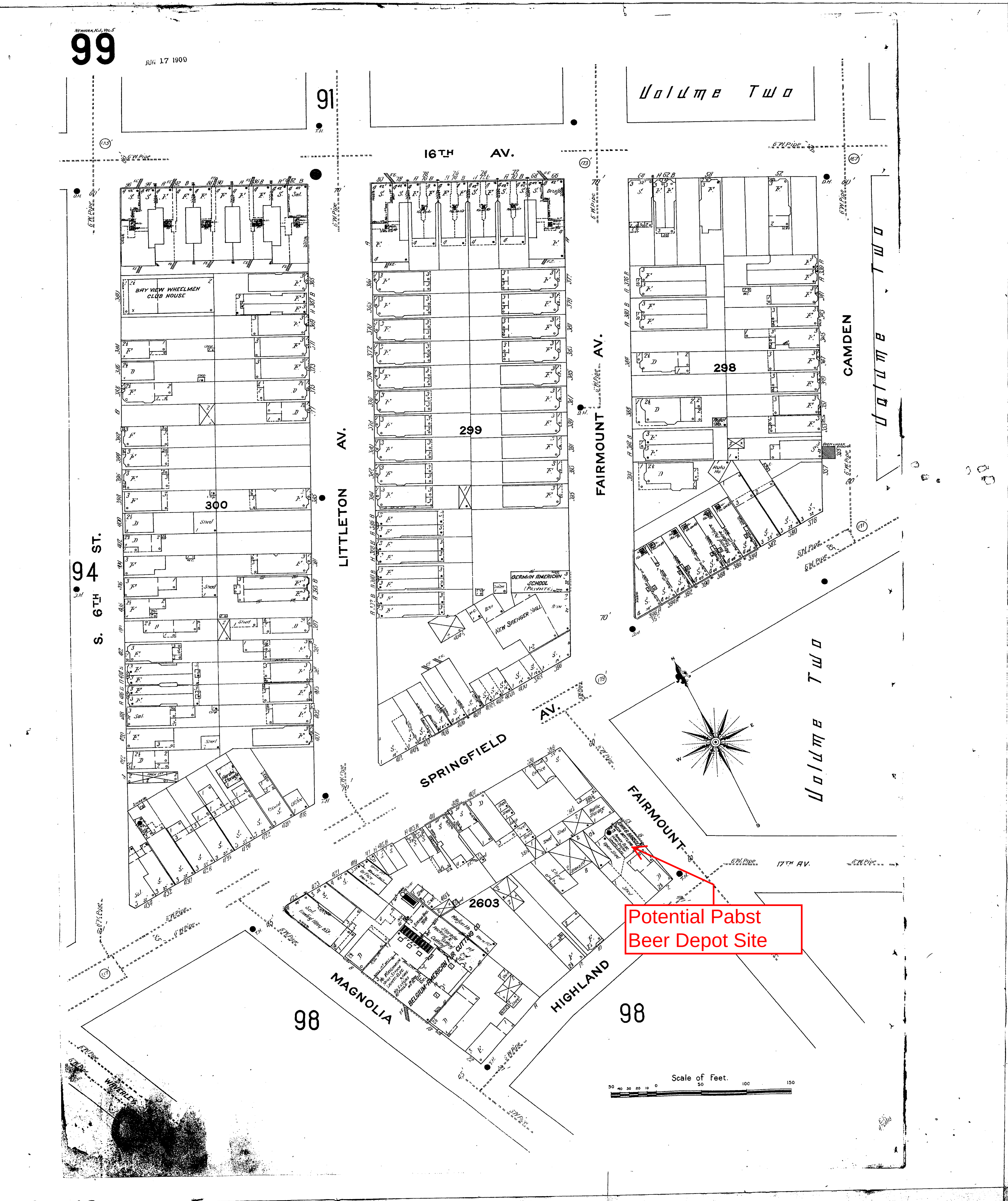
OVERFLOW DATA EXTRACT

CLAY STREET OVERFLOW CHAMBER
NPDES NO. 033/N-006
NEWARK

Chamber Location and Description

Overflow Chamber Status:	Active
Overflow to:	Passaic River
Character of District Served:	Highly developed residential and industrial area
Overflow Location (See Plate A):	On westerly side of intersection of Clay Street and McCarter Highway
District Outlet Sewer (See Plates A and B):	Twin 111" x 81" semi-elliptical concrete sewers
Outfall to River (See Plates A and B):	Twin 111" x 81" semi-elliptical concrete sewers
Outfall Condition:	Clear of debris and functioning
Tidal Effects:	None noted
Surcharge Effects:	Surcharge evident due to tide gate closure with rising tide
Overflow and Regulator Operation (See Plates B and C):	Under normal dry weather flow conditions, the flow is diverted to the PVSC interceptor via the regulator. During periods of rainfall, a portion of the combined flow enters the interceptor, with the balance overflowing the stop logs and being discharged through the outfall line into the Passaic River, through six tide gates.

ATTACHMENT 29



99
JUN 17 1909
91
Volume Two
16TH AV.
BAY VIEW WHEELMEN CLUB HOUSE
300
299
298
LITTLETON AV.
FAIRMOUNT AV.
CAMDEN
S. 6TH ST.
94
GERMAN AMERICAN SCHOOL (PRIVATE)
NEW SAENGER HALL
SPRINGFIELD AV.
FAIRMOUNT
17TH AV.
2603
BELGIUM-AMERICAN HAIR CUTTING CO.
MAGNOLIA
HIGHLAND
98
98
WAVERLEY
Scale of Feet.
Potential Pabst Beer Depot Site

ATTACHMENT 30

NEWARK DIRECTORY

1909

124

CONTAINING

A General Directory of the Citizens,
Classified Business Directory, Street Directory, New Map,
a Record of the City Government, its Institutions, etc.

VOL. LXXIV

PRICE, $7.00

THE PRICE & LEE COMPANY, PUBLISHERS
843 BROAD STREET

2

Boot and Shoemakers and Repairers—Cont.

Sturchio Antonio 35 Clifton av
Suglia Antonio 412 13th av
Summerblum Leopold 43 Jones
Suriente Pasquale 68 Mt Prospect av
Susman Morris Herman c South
Swiretck John 138 Howard
Szisorek Samuel 437 Springfield av
Tabbuck Max 197 Prince
Tarantino Emilio 271 18th av
Tashjiam Michael 93 Elm
Tedesco John 41 Sussex av
Terzo Santo 259 Washington av
Teske Sophonian 85 West
Tilley James C 309 Bank
Tongieto Tomaso 41 Crane
Totarelli Joseph 507 Market
Travisano James 448 18th av
Trien Samuel 85 Springfield av
Troiano Frank 115 Sherman av
Tuite Louis 83 Rose
Turiello Frank 63 Stirling
Turo Michael 79 S 6th
Tutola Raffaelo 505 S Orange av
Twentiteh Century Shoe Repair Factory 5 Branford pl
Uiglini Antonio 57 Hermon
Valenza Gaetano 87 Roseville av
Vasta Carmelo 358 6th av
Vederosa Carmen 241 8th av
Verderosa Michael 97 Central av
Verdi Philip 79 S 7th
Vetero Antonio 443 15th av
Vetrono Joseph 5 West
Vidardi Frank 143 West
Vigiano Andrew 952 S Orange av V
Villani Pasquale 97 New
Wackenhuth John 115 Barclay
Walz Leopold 200 Morris av
Wanderer Berthold 49 Gold
Warschafsky Isidore 111 Mulberry
Watnick Jacob 40 N Canal
Waxman Abraham 149 Charlton
Weber Martin 129 Morton
Weinstein Isadore 212 Bank
Welsher Abraham 876 S Orange av V
Wichnowitz Abraham 144 Livingston
Wigler 68 Broome
Yasner Samuel 762 Hunterdon
Yivanovitz Abraham 60 Rutgers
Zauber Philip 101 Barclay
Zeitz Samuel 18 N Canal
Ziegler Gerson 81 Mercer
Zoikiewicz Antone 118 S Orange av
Zorwich Morris 74 Monmouth

Boot and Shoe Mfrs.
(See Shoe Mfrs.)

*** Boring Machines.**

BINSSE MACHINE CO. THE, Passaic av c New, Harrison—See p 160

Bottle Dealers.

BREWERS' AND BOTTLERS' SUPPLY CO. THE, 52 Lafayette—See p 43
Delisa Matthew 63 Jackson
Foley & Bro 48 Morris av
Froehlich Aaron 169 Newark
Haussling & Baader 13 Springfield av
Hoernlein B & Son (wholesale and retail) 174 Boyd
Hornlein Fred Jr 389 S 9th
Holle John 278 Livingston
Loprete Demetrio 203 Frelinghuysen av
Saldutti Felix 21 Madison
Saldutti M Lanze 61 Downing
Schubert August 193 Livingston
Venotti Luigi 77 Delancy
Venuto Angelo A 358 Chestnut

Bottle Mfrs.

South Jersey Glass Works 52 Lafayette

Bottle Stopper Mfrs.

Imperial Stopper Co 48 Spring

Bottlers.

Abendschoen William (weiss beer) r 45 S 6th
Adam Edwin 42 Av L
Adubato Michael (beer) 237 8th av
Ayasse Henry 459 Ferry
BALLANTINE P. & SONS (ale), Front c Rector—See p 37
BALLANTINE & CO., 437 Ferry and 58 Freeman—See p 37
Barack Isaac (oils, catsups, etc.) 119 Prince
Baumann Chris (beer) 157 Bruce
Baust Frederick (beer) 163 Brill
Birkenhauer & Baumann Old Fashioned Brewery Co 258 Morris
Blaunfeldt Max F (beer) 639 S 18th
Braunschweig Albert H (beer) 412 15th av
Breintnall Llewellyn 276 Runyon
Central Bottling Co The (beer) 247 Runyon
Coca-Cola Bottling Works of New York 171 Ogden
Consolidated Bottling Co of Newark N J (ale beer and porter) 331 Orange
Corish Patrick H (mineral water) 63 Lexington
Crystal Bottling Works r 217 Broome
Denning Thomas F 121 South
Dombrosky Herman F (lager, ale and porter) 146 Leslie
DuBOIS BREWING CO., 310 Jelliff av—See p 36
EAGLE BREWING CO. THE, 20 Hayes—See p 41
Eben's Woodside Bottling Works (beer) 7 Halleck
FEIGENSPAN CHRISTIAN (a corporation), 34 Freeman—See p 40
FERGG'S JOHN BREWERY, Inc., 169 William—See p 36
Gash & Lafkowitz 79 Monmouth
Gerardo Oscar (beer) 185 Newton
GLIKIN WILLIAM, 20 Camden—See p 44
Goepferich Adolph C 67 Wall
Gottwalt Stephen A 70 S 8th
HAUCK PETER A. CO., 500-518 Harrison av, Harrison, N. J.—See p 39
Haug Frederick 32 Mechanic
Heinzmann Anton 361 Hawthorne av
Heitzmann Adolph (beer) 293 Camden
Heuring William (beer), 235 Hawthorne av
HORTON E. E. (soda water) 43 New York av—See p 43
Imhof & Goertz 439 S 12th
Klena & Schneider (beer) 29 Alyea
KRUEGER GOTTFRIED BREWING CO. (bottling dept.), 59 Belmont av—See p 38
Leslie Bottling Works (beer) 148 Leslie
LYON & SONS BREWING CO., Lafayette c N J R R av—See p 42
Minichino Marco 6 Cutler
Moehring John 411 Central av
MOHR PHILIP (beer), 513 S 10th—See p 42
MUNZ RUDOLPH, JR. (beer), 30 Beacon—See p 36
PABST MILWAUKEE BEER DEPOT (beer), 7-15 E Fairmount av—See p 41
PANNICK & KIEFER (beer), 20 Hayes—See p 42
Papavero & Verutto (mineral waters) 226 8th av
Powell Allan L 1236 Broad
Reinhardt William (beer) 61 3d
Roth & Smith Eilzabeth av c Meeker av
Saalmuller John (beer) 601 S 11th
Schmidt Jacob Jr 284A Washington av
Schneider George (beer) 29 Alyea
Strouse Edward 17 William
Trowbridge Lewis Jr 121 South
Union Brewing Co of Newark Bottling Department 415 Morris av
WIEDENMAYER GEORGE W., Inc., 596-604 Market—See p 42
Wirtz William Co 132 Union
Zemelsky Louis 144 Baldwin

Bottlers' Exchange.

New Jersey Bottlers' Protective Association 20 Prospect pl
United Bottlers' Association of New Jersey 240 Broome

Bottlers' Machinery Mfrs.

Gilchrist Co (corking) 236 Bank
HAUSSLING SODA APPARATUS MFG. CO., 26 Arlington—See p 240

Bottlers' Supplies.

Biertumpfel Cork Co (corks) 41 Av C
BREWERS' AND BOTTLERS' SUPPLY CO. THE, 52 Lafayette—See p 43

Brass and Wire Railings.

(See Iron Fence and Railing Mfrs.)

EXCELSIOR WIRE, IRON AND BRASS WORKS, 352 Irvington av, S. Orange, N. J. —See p 258
INDUSTRIAL WIRE AND METAL WORKS. 8 Bloomfield av—See p 258
Newark Wire and Brass Works 30 Lawrence
PLANT BENJAMIN, 16 Kirk al—See p 200
STORSBERG FRITZ, 20 Atlantic—See p 86

Brewers.

Adam Edwin 42 Av L
ANHEUSER-BUSCH, NEWARK AGENCY, 21-25 N 9th—See p 40
BALLANTINE P. & SONS (ale), 54 Fulton—See p 37
BALLANTINE & CO. (lager), 58 Freeman—See p 37
Birkenhauer & Baumann Old Fashioned Brewery Co 258 Morris av
Consumers' Brewing Co of Newark N J (lager and ale) 312 Springfield av
DuBOIS BREWING CO., 310 Jeliff av—See p 36
EAGLE BREWING CO. THE, 20 Hayes—See p 41
ESSEX COUNTY BREWING CO., 63 Clifton av—See p 39
FEIGENSPAN CHRISTIAN (a corporation), 34 Freeman—See p 40
FERGG'S JOHN BREWERY, Inc., 169 William —See p 36
Freibott M J & Co (birch beer) 30 17th av
HAUCK PETER & CO., 500-518 Harrison av, Harrison, N. J.—See p 39
HENSLER JOSEPH BREWING CO. THE, 73 Hamburg pl—See p 38
HOME BREWING CO. THE, 13 Hudson—See p 41
KASTNER F. J. CO. THE, 13 Lewis—See p 43
KRUEGER GOTTFRIED BREWING CO., 75 Belmont av—See p 38
LYON & SONS' BREWING CO., 97 S Canal—See p 42
PABST MILWAUKEE BEER DEPOT 7 to 15 E Fairmount av—See p 41
Trefz C 28 Beacon
Union Brewing Co of Newark 333 Springfield av
Wahlers Dietrich estate of (birch beer) 232 Peshine av
WIEDENMAYER GEORGE W., Inc., 596 Market—See p 42

Brewers' Supplies.

BREWERS' AND BOTTLERS' SUPPLY CO. THE, 52 Lafayette—See p 43
Consolidated Mfg Co 54 Belmont av
Fergg Joseph Co 169 William
SOMMER JOHN FAUCET CO., 355 Central av —See p 260

Brick Mfrs.

Blue Ridge Enameled Brick Co (enameled) (720) 763 Broad
HARPER DAVID, Harrison av c Passaic av, Harrison, N. J.—See p 170
Metropolitan Paving Brick Co 127 Frelinghuysen av
Milharking Contracting and Supply Co 837 Broad
SAYRE JAMES R. JR. & CO., 2d wharf south Centre Street depot—See p 169
Sayre & Fisher Co foot Center
Standard Brick Co office 502 Broad yards Mountain View
United Porcelain Faced Brick Co (porcelain face) (21) 192 Market

Bridge Builders.

BERLIN CONSTRUCTION CO., (605) 164 Market—See p 46
Cooper Iron Works Emmett c Av D
HAY FOUNDRY AND IRON WORKS, 93 Plum Point lane—See p 118
Hedden Iron Construction Co 22 Clinton
PAYNE BROTHERS, (9) 22 Clinton—See p 117
SANDFORD A. E. CO., 158 Passaic, branch Second National Bank bdg, Hoboken—See p 46
Stillman F. M. Co (608) 11 Clinton

Brokers.

American Debenture Co (investment) (303) 11 Clinton
BERRY JAMES A. (loan), 40 Clinton—See p 219
BLASBERG & ZIEGLER (loan), 30 Clinton—See p 224
Bolles Fred M. (4) 188 Market
BOND E. E. & CO. (loan), 756 Broad—See p 217 and top and foot lines
BOWERS PHILIP J. & CO. (real estate), (2) 189 Market—See p 216
BRYCE P. LYNDON (loan), (1) 780 Broad—See p 222
Butler F W & Co (bond) 485 Clinton av
Byrne & McDonnell (stock) 776 Broad
CANFIELD GEORGE D. & SON (loan), 711 N 4th Harrison, N. J.—See p 226
Chester Securities Co. (investment) (303) 11 Clinton
Commercial Trading Co. (merchandise) 88 Academy
Conlon R P & Son 742 Broad
Conti Cesare (money) 19 Market
Crater & Co (note) (508) 222 Washington
Crescent Trading Co (merchandise) 343 Market
Dey Leslie G (grain) (303) 800 Broad
Dickinson, Grummon & Co 751 Broad
DICKINSON JOHN & CO. (stock and securities), 800 Broad, entrance 5 Mechanic—See p 14
Dobbins Frederick A (yacht) Riverside av n Chester av
DUFFY EDWARD F. (local investment), 800 Broad, entrance 5 Mechanic—See p 14
Duryee Ernest N (stock) (503) 776 Broad
EGNER HERMAN J. (stock), (606) 763 Broad —See p 16
EISELE & KING (stock), 750 Broad—See back cover
Ellsworth Co The (investment) (45) 156 Market
Federal Realty and Finance Co (investment) (10) 191 Market
Fera Giacomo 294 VanBuren
Freeth Alfred J (stock) (401) 185 Market
Frerichs Frank (stock) (605) 800 Broad
Germanus Emil 97 Mercer
GROEL JOHN C. (loans), 43 Clinton—See p 224
HALSEY & WHEELER, (real estate), Springfield av c Shipman—See p 217
Healy George P (investment) (26) 810 Broad
Holbrook Amos F 180½ Market
Household Loan Co (loan) (201) 238 Washington
Hunnter & Crane (investment) (219) 800 Broad
Johnson Percy H (coffee) 77 Mechanic
KRIMKE PHILIP (loan), 29 Academy—See p 123
Leonard Bros (investment) (509) 222 Washington
LESCHZIMER S. & CO. (real estate), (303) 776 Broad, also 30 Church, New York city—See front cover
Mann Louis (loans) (528) 800 Broad
McCraith Charles E (622) 800 Broad
Miller C O (stock) 794 Broad
Mitchell Julius (loan) (22) 103 Market
MOELLER FERD R. (local securities), 859 Broad—See front and back covers
MORSE MYRON W. (loan), 139 3d av—See p 223
Morss S B (investment) (36) 122 Market
Mutual Loan Co (loan) (24) 122 Market
New Jersey Finance Co (loans) (312) 738 Broad
New Jersey Loan Co (loans) (304) 142 Market
New Loan Co (loan) 201 Springfield av
Newark Loan Co 33 Academy
Newark Provident Loan Association (loan) 207 Market
Normand Wilson & Schubert (investment) (311) 11 Clinton
Norton Harry A (business) 792 Broad
Padula James V 222 Bruce
People's Loan and Brokerage Co (loan) (401) 185 Market
POST & FLAGG (stock and investment), 774 Broad—See p 15
QUINN B. J. JR. & CO. (stock), 736 Broad—See p 14
Rhodes Charles S (hay and grain) (1018) 763 Broad
Riddel T Ewing (36) 122 Market
Ripley & Cooper (stock) 808 Broad

NEWARK DIRECTORY

120

1911

CONTAINING

A General Directory of the Citizens,
Classified Business Directory, Street Directory, New Map,
a Record of the City Government, its Institutions, etc.

VOL. LXXVI

PRICE, $7.00

THE PRICE & LEE COMPANY, Publishers

Yannelli Nicholas 485 15th av
Young Frederick V 396 S 10th
Yovino Raffael 1249 Broad
Zarra James 239 Bank
Zauleg Adolf 672 Springfield av
Zenna Harry 567 Central av
Ziccardi Raphael 290 15th av
Zimmer Joseph 233 Court
Zimmer Philip 448 Clinton av
Zinckgraf Jacob 764 Broad
Zirpoli Carmine 53 Jefferson
Zwissler Frank 47 Darcy

Barbers' Supplies.

Brown Henry A 97 Springfield av
Dallman Ernest 307½ Springfield av
Lentschner Max 185 Broome
Luciano Pellegrino 14 Cutler
Muntler Herman 288 Springfield av
Odell R & Co 9 Homestead Park
Scharf Louis 112 Barclay
Schmitt Bros 293 Plane

Bark Dealer.

Smith H Stacy 565 Ferry

Barrel Dealers.

Ebersberger John 129 Gotthart
HEINKEL GEORGE E., 154-160 Bowery—See p 86
Ryan John 320 South
Scuorzo Pasquale 235 Oliver
Taylor William F 313 Chestnut

***Barrels Re-Coopered.**

Taylor William F 313 Chestnut

Basket Mfrs.

Holtz John J 225 Ferry
Kallensee Otto 458 Bergen
Moreau Jules L 39 Centre Market walk

Baths.

(Vapor, Turkish and Russian.)

Ordna Sven 927 Broad
Fuchs Fred B (electric light) 591 Broad
Howard Bath 145 Howard
Ishler Abraham 188 Broome
Kritchor Pinkus 31 Charlton
Newark Turkish Bath Co 10 W Park
Sandis Rosa 36 Charlton

Bedding.

(See Mattress Mfrs.)

Beef Packers.

NEWARK PACKING CO., 217 Astor—See p 117

Beer Bottlers.

(See Bottlers.)

BRASSER JOHN B., 7-15 E Fairmount av—See p 44
Diamond Bottling Co 21 Madison
FREEH CHARLES, 247 Runyon—See p 44
Gottwalt Stephen A 70 S 8th
Kemper Theodore 828 S 14th
Mohr Philip 513 S 10th
MUNZ RUDOLPH, 30 Beacon—See p 44
PANNICK & KIEFER, 20 Hayes—See p 44
PABST MILWAUKEE BEER DEPOT, 7-15 E Fairmount av—See p 44
Rose Charles E 371 Plane

Beer Pumps and Faucets.

Lacmann Bros 198 Ferry
Schlichting A T 263 Market
Schmander George J 54 Belmont av

Beer and Ale Pipe Cleaning.

Schneider's William Son 133 Magazine

Belt Dressing Mfrs.

MEIER-ANDRES BELTING CO. THE, 146 Lafayette—See p 159
Slipno Co (33) 122 Market
Standard Oil Leather Dressing Co 219 Market

***Belt Lacing Mfrs.**

PHOENIX BELTING AND OIL CO., 227 Bruce—See p 159
Snap Detachable Belt Fastener Co (snap detachable fastener) 146 Lafayette

Belting Dealers.

(See also Mfrs. and Mill Supplies.)

BANISTER & POLLARD CO. 206 Market—See p 118
CRANE CO., 45 Mechanic—See p 256
CRANE & MILLIGAN, 54 Mechanic—See p 119
MACKNET & DOREMUS CO., 796 and 798 Broad—See top lines

Belting Mfrs.

COUSE & BOLTEN, 25 Camfield—See p 160
DeFORGE BELTING CO., Inc., 301 Market—See p 160
DICK R. & J., ltd. (balata) 289 Market—See p 160
Gaskell Charles L Mrs 29 Fillmore
Ladew Edward R estate of 307 Market
MEIER-ANDRES BELTING CO. THE, 146 Lafayette—See p 159
Meier's Joseph Sons 306 Market
PHOENIX BELTING AND OIL CO., (round), 227 Bruce—See p 159
ROSSENDALE-REDDAWAY BELTING AND HOSE CO., 32 Euclid av—See p 159
Walker's Charles W Sons & Co 274 Market
WEBB MFG. CO. (wire), 156 Front foot Centre—See p 207

***Beneficial Organizations.**

(See Societies, Associations, etc.)

Bicycle Dealers, Repairers and Supplies.

Austin Herbert 81 Orange
Belmont Cycle Co 345 Broad
Block B Vera (motor cycles) 512 Central av
Bush & MacDougall 47 William
Cornish F C (repairer) 219 Clinton av
Ditzel George 141 Elm
Dunn Charles C 4 Frelinghuysen av
Eastern Exchange (motor cycles) 87 Orange
Esposito George 16 Garside
Haverford Cycle Co 945 Broad
Jackson Thomas D 180½ Badger av
Janu Frank (repairer) 399 S 7th
Kalnitzky Hyman 193 Broome
Koehler H J Sporting Goods Co (motor cycles) 291 Halsey
Kohn Anthony 181 Runyon
Kopatonsky Abraham 167 Spruce
Krebs Charles 51 William
Langel Harry 322 Halsey
Levin Adolph 347½ Morris av
Nole Joseph (repairer) 91 Howard
Nole Vito 217 8th av
Plate Herman 611 Springfield av
Popick Abraham 47 S Orange av
Priester George P 119 Roseville av
Schulz William 44 S Orange av
Simonet Justa 701 S Orange av V
Simpson G Washington 291 Orange
Titze Robert 332 Broad
Wurth Louis J 26 William

Bicycle Supplies.

(See Bicycle Dealers, Repairers and Supplies.)

Bill Distributors.

HUMMEL HENRY J., 669 Springfield av—See p 5
NEWARK BILL POSTING CO., 27-33 Treat pl—See p 43

Boiler Setters.
(See Masons.)

Boiler and Pipe Covering.

JOHNS H. W. MANVILLE CO. (asbestos), (35) 45 Clinton—See p 157

Bologna Mfrs. and Dealers.

Fink A & Sons 131 Belmont av
Pfeifer Henry 57 Napoleon
Vossmeyer Louis C (dealer) 383 Walnut

Bolt Mfrs.

SMITH'S ALBERT SONS, 73 N J R R av—See p 179

Book Binders.
(See also Blank Book Mfrs.)

BAKER PRINTING CO., 251 Market—See p 263
Enderlin F & Son 224 Market
Essex Press The, 216 Market
GEIGER BROS., 77 Springfield av—See p 6
Groebe-McGovern Co 81 Clinton
Grover Bros 764 Broad
Hardy George A 870 Broad
Hubel & Sailer Co 252 Market
Jacobs Rudolph 243 Market
Koch William & Sons 61 N J R R av
Pierson Amzi & Co 30 Clinton
PLUM MATTHIAS, 19 Clinton—See p 263
Scheller John C 36 Franklin
Schrafft Theodore F 77 Springfield av

Booksellers and Stationers.
(See also Stationers.)

BAKER PRINTING CO. (stationers), 251 Market—See p 263
BRANT R. RUSSELL, 237 Market—See p 43
Buob Bros 236 Springfield av
Dressel Charles H (old) 552 Broad
Essex Book Co 528 Broad
GEIGER BROS., 77 Springfield av—See p 6
Grover Bros (blank books and stationery) 764 Broad
Herr Votslau F 64 Belmont av
Hummel Mary 669 Springfield av
Kinsella Patrick H (second-hand) 80½ New
Klauber H Francis 16 West
Mendelson Morris 150 Prince
Monaghan Bernard F 276 Elm
MULLIGAN PATRICK F., estate of, 920 Broad—See p 43
National Law Book Exchange (406) 828 Broad
Newark Book and Art Exchange (510) 671 Broad
Newark News Co 231 Washington
P & S Trading and Furnishing Co (serial books and premiums) (714) 238 Washington
Seldin Isadore 592 Orange
SHURTS W. H. CO. THE (stationers), 847 Broad—See p 263
Soney & Sage (law) 42 Clinton
St Vincent Supply House (Catholic) 107 Washington
Sutta Albert 294 Plane
Winans George E 556 Orange

Boot Blacking Establishments.

Arminiello Francesca 421 Broad
Baggott James S 80B Belleville av
Bakos Stephen 106½ and 140½ Market
Bogres John 50 Market
Bruce Chris B 171 and 172 Market
Calemano Antonio 790 Broad
Caputo Anthony (corridor) 763 Broad
Caputo Giuseppe 51½ Ferry
Carlucci Antonio 14 Belleville av and 472 Broad
Dondiego Michele 417 Springfield av
Gianaras Nicholas 17 Springfield av
Gumas George 224 Washington
Hereklos Markos 264 Market
Karydis Bros 459 Broad
Mellillo & Co 97 Springfield av
Metsky Herman 57 Market
Nickopolous George 306 Market
Pavlidakey Bros 423 Broad
Plates Bros 304 and 183 Market
Ropino Francesco 241 Springfield av
Rosinas Peter 124½ Springfield av
Russo Gennaro (basement) City Hall
Spera Carmine 97 Ferry
Tornillo Giuseppe 22 Plane
Trotta Michele 2 Bloomfield av
Zarrilla Rocco 427 Broad

Boot and Shoe Dealers.
(See Shoe Dealers.)

Boot and Shoe Makers and Repairers.
(See Shoe Makers and Repairers.)

Boot and Shoe Mfrs.
(See Shoe Mfrs.)

*** Boring Machines.**

BINSSE MACHINE CO. THE, Passaic av c New, Harrison—See p 199

Bottle Dealers.

Adam & Alfano 300 E Kinney
BREWERS' AND BOTTLERS' SUPPLY CO. THE, 52 Lafayette—See p 52
Delisa Matthew 63 Jackson
Foley & Bro 48 Morris av
Froehlich Aaron 169 Newark
HOERNLEIN B. & SON (wholesale and retail), 174 Boyd—See p 250
Kestenbaum S 188 Livingston
Loprete Demetrio 203 Frelinghuysen av
Salduti Felix 17-21 Madison
Salduti M Lanza 61 Downing
Schubert August 193 Livingston
Venuto Angelo A 358 Chestnut

Bottle Mfrs.

American-Mono Service Co (paper) Orator n Verona av
Simplex Vacuum Mfg Co (vacuum and nursing bottles) 369 Washington av
South Jersey Glass Works 52 Lafayette

Bottle Stopper Mfrs.

Imperial Stopper Co 48 Spring

Bottlers.

Abendschoen William (weiss beer) r 45 S 6th
Adam Edwin 42 Av L
Adubato Michael (beer) 237 8th av
Ayasse Henry 459 Ferry
BALLANTINE & CO., 437 Ferry and 58 Freeman—See p 45
Baumann Chris (beer) 157 Bruce
Baust Frederick (beer) 163 Brill
Birkenhauer Brewing Co 258 Morris av
BRASSER JOHN B. (beer), 7-15 E. Fairmount av—See p 44
Coca-Cola Bottling Works of New York 171 Ogden
Consolidated Bottling Co of Newark N J (ale beer and porter) 331 Orange
Corish Patrick H (mineral water) 63 Lexington
Crystal Bottling Works r 217 Broome
Denning Thomas F 121 South
Diamond Bottling Co (beer) 21 Madison
DuBOIS BREWING CO., 310 Jelliff av—See p 49
EAGLE BREWING CO. THE, 20 Hayes—See p 50
FEIGENSPAN CHRISTIAN (a corporation), 34 Freeman—See p 49
FREEH CHARLES (beer), 247 Runyon—See p 44
GASH & LAFKOWITZ, 79 Monmouth—See p 232
Glikin William 9 Prince
Goepferich Adolph C 67 Wall
Goerz Gustave 439 S 12th
Gottwalt Stephen A 70 S 8th
HAUCK PETER & CO., 500-518 Harrison av, Harrison, N. J.—See p 47
Haug Frederick 32 Mechanic
HENSLER JAMES R. ALE BREWING CO. THE, 200 Murray—See p 48
Heuring William (beer), 235 Hawthorne av
Horton E E (soda water) 43 New York av
Hygeia Bottling Works (beer) 12 Sunset av V
KRUEGER GOTTFRIED BREWING CO. (bottling dept.), 59 Belmont av—See p 46
Leslie Bottling Works The (beer) 148 Leslie
LYON & SONS BREWING CO., 109 Commerce—See p 51
MALTO BRAU CO. (Malto Brau), 72 Tichenor—See p 50
Margow Ludwig 415 Morris av
Moehring John 411 Central av
Mohr Philip (beer) 513 S 10th
MUNZ RUDOLPH (beer), 30 Beacon—See p 44

MURRAY P. & H. A., 186 Market—See p 143
ORANGE BREWERY (ale, lager and porter), 85 Hill—See p 46
PABST MILWAUKEE BEER DEPOT (beer), 7-15 E Fairmount av—See p 44
PANNICK & KIEFER (beer), 20 Hayes—See p 44
Powell Allan L 1236 Broad
Reinhardt William (beer) 61 3d
Roth & Smith Elizabeth av c Meeker av
Saalmuller John (beer) 601 S 11th
Schmidt Jacob Jr 284A Washington av
Schneider George (beer) 25 Alyea
Strouse Edward 17 William
United States Bottling Co (mineral waters) 204 Charlton
WIEDENMAYER GEORGE W., inc., 596-604 Market—See p 49
Wirtz William Co 264-268 Jelliff av

Bottlers' Exchange.

New Jersey Bottlers' Protective Association 76 Prospect pl
United Bottlers' Association of New Jersey 240 Broome

Bottlers' Machinery Mfrs.

Gilchrist Co (corking) 236 Bank

Bottlers' Supplies.

Biertuempfel Bros Cork Co (corks) 41 Av L
BREWERS' AND BOTTLERS' SUPPLY CO. THE, 52 Lafayette—See p 52
Crown Cap Mfg Co (caps) 60 Nassau
HAUSSLING & BAADER, 13 Springfield av—See p 243
Liquid Carbonic Co Ferry c Freeman
POMEROY I. CO. (wax), 264 Halsey—See p 178
Standard Bottlers' Supply Co 49 William

Bowling Alley Builders.

Zeliff J Sherman 11 Hinsdale pl

*** Bowling Alley Fixtures.**

JAEHNIG GAS FIXTURE CO. (lighting apparatus), 221 13th av—See p 99

Bowling Alleys.

Beck George A 207 Clinton av
Blum George 811 Summer av
Casperson Edward L 44 Badger av
Christonson Christian 995 S Orange av
Dam Jacob 566 Springfield av
Dixon Edward B 114 Hamburg pl
Eichenlaub Frank X 474 Avon av
Empire Bowling Academy 568 Central av
Gannon James L 311 Bank
Helbig Oscar A 405 7th av
Hettenbach F William 264 Washington
Johns Lee R 839 Broad
Kemper Theodore 828 S 14th
Kunst Henry 529 Springfield av
LeGlise George W 197 Thomas
MARTHIS EDGAR H., 167 Bloomfield av—See p 43
Nate John J 519 12th av
Schaefer Henry 361 S 9th
Schober Charles A 202 S Orange av
Schwalbe Louis 10 Camfield
Smith Max 122 Hawthorne av
Smith Thomas D 382 6th av
Turn Verein Vorwarts 95 Lang
Webber John 264 Belmont av
Weingarth Whatton Co 224 Halsey
Woelfle W F 572 Central av

Box Mfrs.

(See Packing Boxes, also Paper Boxes.)

***Box Shooks.**

DODGE & BLISS CO., West Side av c Van Keuren av, Jersey City—See back cover and p 151
VANDERBEEK & SONS, Green c Steuben, Jersey City, N J—See p 152

Brass Finishers.

HEDGES & BRO, inc., 10 Railroad pl—See p 256
NEWARK BRASS WORKS, 22 Lawrence—See p 215
O'Brien & Newton 193 Halsey
WHEATON A. W. BRASS WORKS, Commerce c Railroad pl—See p 174
Yeager Bros 15 Franklin
ZUSI EDWARD A., 101 Monroe

Brass Founders.

Aluminum and Metal Specialty Co 24 Mechanic
Bushauer P estate of 261 Elm
Chambers & Co 2 Commercial
Defreville & Masset 60 Elm
Farille & Marcus (bronze) 131 N J R R av
Forbes Duncan 90 Seymour av
GOLDSMITH C. A., 42 Cutler—See p 172
HEDGES & BRO., inc., 10 Railroad pl—See p 256
HEWES & PHILLIPS IRON WORKS, 6 Orange c Ogden—See p 168
HEWITT JOHN FOUNDRY CO., 18-30 Sherman, East Newark—See p 173
McCarthy John 745 N 6th
REDLINGHOUSE CHARLES & BRO., 147 N J R R av—See p 174
Schueler Anthony & Co 691 S 16th
United Copper Bearings and Metal Co 56 Elm
ZUSI, EDWARD A., 101 Monroe
ZUSI EDWARD, 80 Mechanic—See p 174

Brass Founders' Supplies.

Brass Founders' Supply Co Hamburg pl n Av L

Brass Mfrs.

NEW JERSEY TUBE CO. (sheet rod and tubing), Cross st., Harrison, N. J.—See p 217

Brass Rod Mfrs.

NEW JERSEY TUBE CO., Cross st., Harrison, N. J.—See p 217

Brass Rolling Mill.

NEW JERSEY TUBE CO., Cross st., Harrison, N. J.—See p 217

***Brass Turning.**

WEBB MFG. CO., 156 Front foot Centre—See p 207

Brass and Copper Tubing.

NEW JERSEY TUBE CO., Cross st., Harrison, N. J.—See p 217

Brass and Metal Goods Mfrs.

Aluminum and Metal Specialty Co (specialties), 24 Mechanic
AMERICAN BUTTON CO., 70 Morris av—See p 216
ART METAL WORKS, 9 Mulberry—See p 211
BRABSON BROS., 47 Hamilton—See p 175
Bruemmer Charles (stair rods) 72 Prospect pl
CONLAN B. & CO., 87 Hamilton—See p 213
CRESCENT BED CO. THE (beds) 25 Shipman—See p 209
Fischer Mfg Co The (novelties) 238 South
GOERTZ AUGUST & CO., inc., 276 Morris av—See p 214
Gould's M Son & Co 61 Hamilton
Greacen Walter & Co 12 Mechanic
Greenfield Leo D Mfg Co r 67 Hamilton
HAVELL MFG. CO., 284 Washington—See p 213
HEDGES & BRO., inc. 10 Railroad pl—See p 256
Huebel Mfg Co 103 Monroe
Huebel O H & Co 103 Monroe
INDUSTRIAL WIRE AND METAL WORKS (guards and railings), 8 Bloomfield av—See p 225
Jenkinson R C & Co 289 Washington
Jost's Edmund Sons 48 Dickerson

Brass and Metal Goods Mfrs.—Continued.

LIEBMAN RUDOLPH MFG. CO., 73 Bruen—See p 216
Meisselbach A F & Bro 26 Prospect
Mergott J E Co The 320 Jelliff av
METAL NOVELTY CO., 68 Orchard—See p 212
Metallic Art Co 125 N J R R av
New Jersey Metallic Bedstead Co (bedsteads) 76 Mechanic
NEWARK BRASS WORKS, 22 Lawrence—See p 215
NEWARK PURSE FRAME MFG. CO., 552 S. 11th—See p 214
O'Neill & O'Neill 82 Union
Osborn Harvey Silver Co (novelties) 102 Murray
OSBORN J. K. MFG. CO., First c Bergen, Harrison, N. J.—See p 213
Phoenix Mfg Co 21 Baldwin
PLUMB DAVID S., 57 Park—See p 217
Premo Mfg Co 130 Pacific
Preston & Steele Green c N J R R av
Richmond Bros Co 177 Chestnut
Riper Co The 12 Mechanic
RILEY-KLOTZ MFG. CO., 19 Mulberry—See p 211
Ronson Specialty Co The 9 Mulberry
Rosenband Mfg Co (fancy) 22 Green
Rosenbaum J W & Co 44 Hunter
SOMMER JOHN L. (novelties), 93 Chestnut—See p 215
STANDARD ART METAL WORKS, 64 Union—See p 215
Standard Metal Mfg Co Chestnut c Jefferson
Standard Tube and Metal Co 609 N 3rd
STORSBERG F. CO., 20 Atlantic—See p 98
Suriye Charles (candlesticks) 177 Spruce
Wagenbach A J 60 Arlington
Walker D Mfg Co (stair rods) 274 Market
ZUSI EDWARD A., 101 Monroe

Brass and Wire Railings.

(See Iron Fence and Railing Mfrs.)

INDUSTRIAL WIRE AND METAL WORKS, 8 Bloomfield av—See p 225
STORSBERG F. CO., 20 Atlantic—See p 98

Brewers.

Adam Edwin 42 Av L
Anheuser-Busch Newark Agency Park av and N 11th
BALLANTINE P. & SONS (ale and porter), 54 Fulton—See p 45
BALLANTINE & CO. (lager), 58 Freeman—See p 45
Birkenhauer Brewing Co 258 Morris av
DuBOIS BREWING CO., 310 Jelliff av—See p 49
EAGLE BREWING CO. THE, 20 Hayes—See p 50
ESSEX COUNTY BREWING CO., 63 Clifton av—See p 47
FEIGENSPAN CHRISTIAN (a corporation), 34 Freeman—See p 49
Fergg's John Brewery inc 169 William
Freibott M J & Co (birch beer) 30 17th av
HAUCK PETER & CO., 500-518 Harrison av, Harrison, N. J.—See p 47
HENSLER JAMES R. ALE BREWING CO. THE, 200 Murray—See p 48
HENSLER JOSEPH BREWING CO. THE, 73 Hamburg pl—See p 48
HOME BREWING CO. THE, 13 Hudson—See p 50
Kastner F J Co The 13 Lewis
KRUEGER GOTTFRIED BREWING CO., 75 Belmont av—See p 46
LYON & SONS' BREWING CO., 97 S Canal—See p 51
ORANGE BREWERY (ale, lager and porter), 85 Hill—See p 46
PABST MILWAUKEE BEER DEPOT, 7 to 15 E Fairmount av—See p 44
TREFZ C., 28 Beacon—See p 46
Union Brewing Co of Newark 333 Springfield av
Wahlers Dietrich estate of (birch beer) 232 Peshine av
WIEDENMAYER GEORGE W., inc., 596 Market—See p 49

Brewers' Supplies.

BREWERS' AND BOTTLERS' SUPPLY CO. THE, 52 Lafayette—See p 52
Consolidated Mfg Co (ale and beer pump valves) 56 Belmont av
NEWARK BRASS WORKS (brass work), 22 Lawrence—See p 215
Schaub Frank & Sons inc The 33 Clay
SOMMER JOHN FAUCET CO., 355 Central av—See p 226
WHEATON A. W. BRASS WORKS, Commerce c Railroad pl—See p 174

Brick Dealers.

COOK & GENUNG COMPANY, 16 Jersey, 132 Lillie and 460 Ogden

Brick Mfrs.

Blue Ridge Enameled Brick Co (enameled) (720) 763 Broad
Metropolitan Paving Brick Co 127 Frelinghuysen av
Milharking Contracting and Supply Co 837 Broad
REID A. S. & CO., (1501) 784 Broad—See p 52
Sayre & Fisher Co foot Center
SHUTE & CO., (707) 192 Market—See p 52

Brick Mortar

MONUMENT PLASTER CO., ft Essex, Harrison—See p 230

Bridge Builders.

HAY FOUNDRY AND IRON WORKS, 93 Plum Point lane—See p 181
Hedden Iron Construction Co 22 Clinton
LINDE & GRIFFITH CO., 327 6th av—See p 62
PAYNE BROTHERS, inc., Emmet c Av D—See p 180

Brokers.

American Loan Co (loans) (601) 192 Market
Automobile Brokers Association (automobile) (24) 122 Market
BERRY JAMES A. (loan), 40 Clinton—See p 269
BLASBERG & ZIEGLER (loan), 30 Clinton—See p 270
BOND E. E. & CO. (loan), 764 Broad—See p 267 and top and foot lines
Booth Thomas B (stock) 191 Market
Booth-Fitzgerald Co (53) 122 Market
BOWERS PHILIP J. & CO. (real estate), (2) 189 Market—See p 267
Broad Fifty Association (real estate) (22) 845 Broad
Broad Street Investment Co (206) 800 Broad
Brokers Exchange The (real estate) (611) 11 Clinton
Brooks Horace L (provision) 217 Astor
BRYCE P. LYNDON (loan), (1) 780 Broad—See p 276
Butler F W & Co (bond) rear 488 Clinton av
Byles & Biggin (1306) 784 Broad
Byrne & McDonnell (stock) 776 Broad
California Timber and Development Co (real estate) (1509) 784 Broad
CANFIELD GEORGE D. & SON (loan), 711 N 4th Harrison, N. J.—See p 278
Columbia-White Bluffs Irrigated Orchards (investment) (501) 784 Broad
Commonwealth Investment Co (investment) (603) 776 Broad
Compton Nathan R (504) 222 Washington
Conti Cesare (money) 19 Market
Crater & Co (note) (312) 222 Washington
Davett Emile (real estate) 56 Clinton
Dey Leslie G (grain) (1208) 784 Broad
Dickinson, Grummon & Co (403) 786 Broad
Dobbins Frederick A (yacht) Riverside av n Chester av
Duffy Edward F (local investment) (410) 784 Broad
Duryee Ernest N (stock) (408) 784 Broad
EISELE & KING (stock), 752 Broad—See back cover

NEWARK DIRECTORY

1912

CONTAINING

A General Directory of the Citizens,
Classified Business Directory, Street Directory, New Map,
a Record of the City Government, its Institutions, etc.

VOL. LXXVII

PRICE, $7.00

THE PRICE & LEE COMPANY, Publishers
828 Broad Street

Boot Blacking Establishments.

Bakos Stephen 140½ Market
Bogres & Aleferes 50 Market
Bruce Chris B 172 Market
Calemano Antonio 790 Broad
Calimano Antonio 800 Broad
Caputo Anthony 763 Broad
Caputo Giuseppe 51½ Ferry
Carlucci Antonio 472 Broad
Cirminiello Francesco 421 Broad
Corbo Rocco 656 Bergen
Dondiego Michele 417 Springfield av
Gianaras Nicholas 17 Springfield av
Gricobbi Angelo 296 15th av
Karavanos George 15 16th av
Karydis Bros 459 Broad
Marable Henry N 99 Roseville av
Mellillo & Co 97 Springfield av
Metsky Herman 57 Market
Nickopolous George 306 Market
Palandios Nicholas 471 Broad
Papa Donato 62 Orange
Pappas Nicholas 224 Washington
Pavlidakey Bros 423 and 427½ Broad
Petolino Daniel 1 N J R R av
Plates Edward 316 Market
Plates & Kapsimales 183 Market
Possios Peter 520 Broad
Rogers Michael 8 Bloomfield av
Ropino Francesco 241 Springfield av
Rosinas Peter 124½ Springfield av
Russo Gennaro City Hall
Spera Carmine 97 Ferry
Tofaro Joseph 468 18th av
Tomaras James 108½ Market
Tomillo Giuseppe 22 Plane
Trotta Michele 2 Bloomfield av
Zarrilla Rocco 435 Broad
Zervas & Smytaques 264 Market
Zevas John 86 Springfield av and 567 Broad

Boot and Shoe Dealers.

(See Shoe Dealers.)

Boot and Shoe Makers and Repairers.

(See Shoe Makers and Repairers.)

Boot and Shoe Mfrs.

(See Shoe Mfrs.)

Bottle Dealers.

BERK & ALBERG, 238 and 240 Belmont av—See p 275
BREWERS' AND BOTTLERS' SUPPLY CO. THE, 52 Lafayette—See p 63
Delisa Matthew 63 Jackson
Foley & Bro 48 Morris av
Froehlich Aaron 169 Newark
Girandolo & Alfano 259 Elm
HOERNLEIN B. & SON (wholesale and retail), 174 Boyd—See p 276
Hornlein Fred Jr 371 Grove V
Kestenbaum S 188 Livingston
Loprete Demetrio 203 Frelinghuysen av
Newark Bottle Co Av L n Hamburg pl
Saldutti Felix 17-21 Madison
Saldutti M Lanza 90 Jackson
Schubert August 193 Livingston

Bottle Mfrs.

American-Mono Service Co (paper) Oraton n Verona av
Simplex Vacuum Mfg Co (vacuum and nursing bottles) 369 Washington av
South Jersey Glass Works 52 Lafayette

Bottle Stopper Mfrs.

Imperial Stopper Co 48 Spring

Bottlers.

Abendschoen William (weiss beer) r 45 S 6th
Adam Edwin 42 Av L
Adubato & Bros 314 N 6th
Ayasse Henry (lager) 459 Ferry
BALLANTINE P. & SONS, 437 Ferry, office 58 Freeman—See p 56
Baumann Chris (beer) 157 Bruce
Baust Frederick (beer) 163 Brill
Birkenhauer Brewing Co 258 Morris av
BRASSER JOHN B. (beer), 7-15 E Fairmount av—See p 55
Braunschweig H Albert (beer) 581 S 19th
Coca-Cola Bottling Works of New York 171 Ogden
Consolidated Bottling Co of Newark N J (ale beer and porter) 331 Orange
Corish Patrick H (mineral water) 63 Lexington
Crystal Bottling Works r 217 Broome
Denning Thomas F 121 South
Diamond Bottling Co (beer) 21 Madison
DuBOIS BREWING CO., 310 Jelliff av—See p 60
EAGLE BREWING CO. THE, 20 Hayes—See p 61
FEIGENSPAN CHRISTIAN (a corporation), 50 Freeman—See p 60
GASH & LAFKOWITZ, 79 Monmouth—See p 54
Glikin William 9 Prince
Goepferich Adolph C 67 Wall
Goerz Gustave 439 S 12th
Gottwalt Stephen A 39 S 8th
HAUCK PETER & CO., 500-518 Harrison av, Harrison, N. J.—See p 58
Haug Frederick 32 Mechanic
HENSLER JAMES R. ALE BREWING CO. THE, 200 Murray—See p 59
Heuring William (beer), 235 Hawthorne av
Hoffman F & Sons (soda water) 407 Grove
Horton E E (soda water) 43 New York av
KRUEGER GOTTFRIED BREWING CO. (bottling dept.), 59 Belmont av—See p 57
Leslie Bottling Works The (beer) 148 Leslie
LYON & SONS BREWING CO., 109 Commerce—See p 62
MALTO BRAU CO. (Malto Brau), 72 Tichenor—See p 61
MARGOW LUDWIG, 415 Morris av—See p 55
Moehring John 411 Central av
Mohr Philip (beer) 513 S 10th
MUNZ RUDOLPH (beer), 30 Beacon—See p 55
MURRAY P. & H. A., 186 Market—See p 165
ORANGE BREWERY (ale, lager and porter), 85 Hill—See p 57
PABST MILWAUKEE BEER DEPOT (beer), 7-15 E Fairmount av—See p 55
PANNICK & KIEFER (beer), 20 Hayes—See p 55
Park View "Old-Fashioned" Bottling Works 440 Elizabeth av
Powell Allan L 1236 Broad
Reinhardt William (beer) 61 3d
Saalmuller John (beer) 601 S 11th
Schneider George (beer) 25 Alyea
Strouse Edward 17 William
United States Bottling Co (mineral waters) 144 Baldwin
WIEDENMAYER GEORGE W., inc., 596-604 Market—See p 60
Wirtz William Co 264-268 Jelliff av

Bottlers' Exchange.

New Jersey Bottlers' Protective Association 76 Prospect pl
United Bottlers' Association of New Jersey 240 Broome

Bottlers' Machinery Mfrs.

Gilchrist Co The (corking) 236 Bank
WEISCOPF L. CO. THE, 16 Kirk pl and 30 Church, N. Y.—See p 227

Bottlers' Supplies.

Biertuempfel Bros Cork Co (corks) 41 Av L
BREWERS' AND BOTTLERS' SUPPLY CO. THE, 52 Lafayette—See p 63
HAUSSLING & BAADER, 13 Springfield av—See p 268
Liquid Carbonic Co Ferry c Freeman
POMEROY I. CO. (wax), 264 Halsey—See p 203
Standard Bottlers' Supply Co 49 William

Brass and Wire Railings.

(See Iron Fence and Railing Mfrs.)

INDUSTRIAL WIRE AND METAL WORKS, 8 Bloomfield av—See p 250
New Jersey Wire and Brass Works 372 Market
STORSBERG F. CO., 20 Atlantic—See p 116

Brewers.

Adam Edwin 42 Av L
Anheuser-Busch Newark Agency Park av and N 11th
BALLANTINE P. & SONS (ale and porter), 58 Freeman—See p 56
Birkenhauer Brewing Co 258 Morris av
DuBOIS BREWING CO., 310 Jelliff av—See p 60
EAGLE BREWING CO. THE, 20 Hayes—See p 61
ESSEX COUNTY BREWING CO., 63 Clifton av—See p 58
FEIGENSPAN CHRISTIAN (a corporation), 34 Freeman—See p 60
Freibott M J & Co (birch beer) 30 17th av
HAUCK PETER & CO., 500-518 Harrison av, Harrison, N. J.—See p 58
HENSLER JAMES R. ALE BREWING CO. THE, 200 Murray—See p 59
HENSLER JOSEPH BREWING CO. THE, 73 Hamburg pl—See p 59
HOME BREWING CO. THE, 13 Hudson—See p 61
KRUEGER GOTTFRIED BREWING CO., 75 Belmont av—See p 57
LYON & SONS' BREWING CO., 97 S Canal—See p 62
ORANGE BREWERY (ale, lager and porter), 85 Hill—See p 57
PABST MILWAUKEE BEER DEPOT, 7 to 15 E Fairmount av—See p 55
TREFZ CO., 28 Beacon—See p 57
Union Brewing Co of Newark 333 Springfield av
Wahlers Dietrich estate of (birch beer) 232 Peshine av
WIEDENMAYER GEORGE W., Inc., 596 Market—See p 60

Brewers' Supplies.

BREWERS AND BOTTLERS' SUPPLY CO. THE, 52 Lafayette—See p 63
Consolidated Mfg Co (ale and beer pump valves) 56 Belmont av
NEWARK BRASS WORKS (brass work), 22 Lawrence—See p 249
Schaub Frank & Sons inc The 33 Clay
SOMMER JOHN FAUCET CO., 355 Central av—See p 251
WHEATON A. W. BRASS WORKS, Commerce c Railroad pl—See p 106

Brick Dealers.

COOK & GENUNG COMPANY, 16 Jersey, 132 Lillie and 460 Ogden
Upton Francis R (808) 11 Clinton

Brick Mfrs.

Blue Ridge Enameled Brick Co (enameled) (720) 763 Broad
HARPER DAVID, Harrison av and Passaic av, Harrison, N. J.—See p 256
Metropolitan Paving Brick Co 127 Frelinghuysen av
New Jersey Unit Brick & Tile Co (cement) 3 Passaic
REID A. S. & CO., (1501) 784 Broad—See p 63
Sayre & Fisher Co foot Centre

Brick Mortar.

MONUMENT PLASTER CO., selling office (602) 31 Clinton; factory ft Essex, Harrison—See p 255

Bridge Builders.

HAY FOUNDRY AND IRON WORKS, 93 Plum Point lane—See p 206
Hedden Iron Construction Co 22 Clinton
LINDE & GRIFFITH CO., 327 6th av—See p 74
PAYNE BROTHERS, inc., Emmet c Av D—See p 205

Brokers.

Alleman Frederick H (investment) (218) 31 Clinton
Alpine Supply Co (merchandise) 85 Hoyt
American Loan Co (loans) 787 Broad
BERRY JAMES A. (loan), 40 Clinton—See p 293
Biow Samuel L (33) 45 Clinton
BLASBERG & ZIEGLER (loan) 30 Clinton—See p 294
BOND E. E. & CO. (loan), 764 Broad—See p 291 and top and foot lines
Booth-Fitzgerald Co (52) 122 Market
BOWERS PHILIP J. & CO. (real estate), (2) 189 Market—See p 291
Broad Fifty Association (real estate) (32) 845 Broad
Broad Street Investment Co (206) 800 Broad
BROWN R. DONALDSON, (101) 828 Broad—See p 34
BRUEN EDWARD E., (loans), 25 Washington pl, East Orange—See p 307
BRYCE P. LYNDON (loan), (702) 810 Broad—See p 302
Butler F W & Co (bond) 667 Bergen
Byrne & McDonnell (stock) 776 Broad
California Timber and Development Co (real estate) (1509) 784 Broad
CANFIELD GEORGE D. & SON (loan), 711 N 4th Harrison, N. J.—See p 304
Commonwealth Investment Co (investment) (603) 776 Broad
Compton Nathan R (stocks) (506) 185 Market
Conti Cesare (money) 19 Market
Davett Emile (real estate) (20) 11 Clinton
Dey Leslie G (grain) (1208) 784 Broad
Dobbins Frederick A (yacht) Riverside av n Chester av
Duryee Ernest N (stock) (408) 784 Broad
EASTMAN, DILLON & CO., (stock), 810 Broad—See p 32
EISELE & KING (stock), 752 Broad—See back cover
Federal Realty and Finance Co (investment) (10) 191 Market
Feist & Feist (real estate) (400) 738 Broad
Fera Giacomo 296 VanBuren
Fiedler Corporation (real estate insurance) (201) 142 Market
Frankenberger Leo (stock) 172 Market
FREEMAN C. MACLAREN (bonds and commercial paper), 31 Clinton—See front cover
GEISER & PLUM (real estate), (32) 845 Broad—See p 307
Germann Emil 214 Ferry
Griffith Charles G (patent) (35) 122 Market
Guarantee Credit Co (loan) (512) 738 Broad
Gulick Cornelius E (investment) (705) 671 Broad
Hedly George P (investment) (408) 776 Broad
Henry Bros & Co (stock) (27) 755 Broad
HODSON CLARENCE & CO., 1st floor, 31 Clinton—See p 33
HODSON T. SHERWOOD JR., (101) 828 Broad—See p 34
Holbrook Amos F 180½ Market
Household Loan Co (loan) (36) 122 Market
Investors Mortgage Loan Co (mortgage) (303) 776 Broad
Jennings George C & Co (real estate) (1107) 784 Broad
Jennings Philip (real estate) (510) 784 Broad
Johnson Percy H (coffee) 77 Mechanic
KIETLINSKI JEREMIAH A. (real estate), (31) 845 Broad—See p 306
KNOPF FREDERICK R. (loan), (36) 45 Clinton—See p 294
Lackawanna Investment Co (investment) (603) 776 Broad
Martin James L (414) 11 Clinton
McCraith Charles E (613) 800 Broad
Mendel Isaac G (stock) (410) 784 Broad
Miller Charles G (stock) 186 Market
Mitchell Julius (loan) (22) 103 Market
MOELLER FERD R. (securities, stocks and bonds), (205) 800 Broad—See front cover
Morehouse H W Jr Co The (investment), (603) 776 Broad
MORSE MYRON W. (loan), 139 3d av and (520) 29 Clinton—See p 295

NEWARK'S
250th ANNIVERSARY CELEBRATION

COMPILED BY
HENRY WELLINGTON WACK
EXECUTIVE ADVISER
COMMITTEE OF ONE HUNDRED

FOR
THE NEWARK DIRECTORY
THE PRICE & LEE CO. OF N. J.
PUBLISHERS, 224 MARKET STREET

1916

Bottlers.

Abendschoen William (weiss beer) r 45 S 6th
BALLANTINE P. & SONS, 437 Ferry, office 58 Freeman—See p 56
Beron Martin (lager) 459 Ferry
Birkenhauer Brewing Co 258 Morris av
BRASSER JOHN B. (beer), 7-15 E Fairmount av—See p 55
Braunschweig H Albert Mrs (beer) 581 S 19th
Coca-Cola Bottling Works of New York 171 Ogden
Consolidated Bottling Co of Newark N J (ale beer and porter) 331 Orange
Corish Patrick H (mineral water) 63 Lexington
Crystal Bottling Works r 217 Broome
DuBOIS BREWING CO., 310 Jelliff av—See p 60
EAGLE BREWING CO. THE, 20 Hayes—See p 61
ESSEX COUNTY BREWING CO., 63 Clifton av—See p 58
Farber Bros 560 S 12th
FEIGENSPAN CHRISTIAN (a corporation), 50 Freeman—See p 60
GASH & LAFKOWITZ, 79 Monmouth—See p 5
Goepferich Adolph C 67 Wall
Goerz Gustave 439 S 12th
Golden Star Bottling Co 91 Warwick
Gottwalt Stephen A 39-41 S 8th
HAUCK PETER & CO., 500-518 Harrison av, Harrison, N. J.—See p 58
HENSLER JOSEPH BREWING CO. THE (ale and bottling dept.), (lager and ale), 192-204 Murray—See p 59
Hoffman F & Sons (soda water) 407 Grove V
Horton E E (soda water) 43 New York av
Jacobson & Hodes (mineral water) r 49 Livingston
KRUEGER GOTTFRIED BREWING CO. (bottling dept.), 59 and 75 Belmont av—See p 57
Leslie Bottling Works The (beer) 148 Leslie
LYON & SONS BREWING CO. (bottling dept.) 109 Commerce—See p 61
Malto Brau Co (Malto Brau) 72 Tichenor
MARGOW LUDWIG, 415 Morris av—See p 55
Moehring John 411 Central av
Mohr Philip (beer) 513 S 10th
MUNZ RUDOLPH (beer), 30 Beacon—See p 55
MURRAY P. & H. A. INC., 186 Market—See p 161
Newark Bottling Works (oil and vinegar) 212 Charlton
PABST MILWAUKEE BEER DEPOT (beer), 7-15 E Fairmount av—See p 55
PANNICK & KIEFER (beer), 20 Hayes—See p 55
Park View "Old Fashioned" Bottling Works 440 Elizabeth av
Reinhardt William (beer) 61 3d
Saalmuller John (beer) 601 S 11th
Schmidt Jacob 79 Grafton av
Schneider C F & Co (soda) 387 S 11th
Strouse Edward 17 William
United States Bottling Co (mineral waters) 144 Baldwin
Wachter George (vinegar) 91 Garrison
WIEDENMAYER GEORGE W., Inc., 596-604 Market—See p 60
Wigder B inc 291 Norfolk
Younghaus Ernest R (beer) 666 S 15th

Bottlers' Exchange.

United Bottlers' Association of New Jersey 77 Monmouth

Bottlers' Machinery Mfrs.

Gilchrist Co The (corking) 236 Bank

Bottlers' Supplies.

Biertuempfel Bros Cork Co (corks) 37-41 Av L
Carroll Joseph A 332 Sussex av
Dane Mfg Co (Porcelain Siphon Heads) 333 6th av
Haussling & Baader 13 Springfield av
Liquid Carbonic Co Ferry c Freeman
Newark Cork Products Inc 245-247 N J R R av
POMEROY I. CO. (wax), 264 Halsey—See p 200
Standard Bottlers' Supply Co 203 Mulberry

Bowling Alley Builders.

BRUNSWICK-BALKE-COLLENDER CO. OF N. J. THE, 257 Market—See p 52
PETERSEN ALBERT N., 59 Branford pl—See p 29

* Bowling Alley Fixtures.

JAEHNIG GAS FIXTURE CO. (lighting apparatus), 221 13th av—See p 105

Bowling Alleys.

Beck George A 207 Clinton av
Eichenlaub Frank X 474 Avon av
Gannon Joseph L 311 Bank
Huttenbach F William 262 Washington
Jackie Clark Amusement Co 32 Branford pl and 64 Park pl
Kemper Theodore 828 S 14th
Kloepfer Charles 328 Runyon
LeGlise George W 197 Thomas
Lehner Kalman 63 16th av
Lieber Charles A 114 Hamburg pl
MARTHIS EDGAR H., 167 Bloomfield av—See p 52
Metz Charles 425 Springfield av
Moeltner Frank 32 17th av
Nate John J 519 12th av
Schober Charles A 202 S Orange av
Schwalbe Louis 54 Branford pl
Semon Edward 995 S Orange av V
Shaw Louis 227 Ferry
Smith Max 122 Hawthorne av
Smith Thomas D 832 6th av
Wagner Fred 95 Lang
Wass Oscar 11 16th av
Webber John 264 Belmont av
Weingarth & Whatton 839 Broad
Werner Herman 361 S 9th
Woelfle William F 372 Central av
Woodhouse James 257 Washington av

Bowling Ball Mfrs.

Kolhaut John C 14 N J R R av

Box Mfrs.

(See Packing Boxes, also Paper Boxes.)

*Box Shooks.

Aubertin-Schneider Co (28) 845 Broad
DODGE & BLISS CO., West Side av c Van Keuren av, Jersey City—See back cover and p 169
HILL & MOUNT (wholesale), (222) 31 Clinton—See p 171
UNIVERSAL STAMP WORKS, 252 Market—See p 113

*Brass Checks.

HOFFMANN CARL, 81 Springfield av—See p 113

Brass Finishers.

HEDGES & BRO. Inc., 10 Railroad pl—See p 194
JENKINS MFG. CO., 35 Farrand, Bloomfield—See p 194
NEWARK BRASS WORKS, 22 Lawrence—See p 233
O'Brien & Newton 48 Mechanic
Standard Polishing and Plating Co 36-40 Crawford
STEFFENS-AMBERG CO. THE, 260 Morris av
Wheaton A W Brass Works Commerce c Railroad pl
Zusi Edward A 101 Monroe

Brass Founders.

BIRTWISTLE EDWARD S., 358 6th av—See p 195
BRABSON BROS., 47 Hamilton—See p 197
Bushauer P estate of 261 Elm
Defreville Julius 142 McWhorter
Forbes Duncan 90 Seymour av
Goldsmith C A 42 Cutler
Griffoul A and Bros Co 280 Chestnut

Hanus & Marcus 131 N J R R av
HEDGES & BRO. inc., 10 Railroad pl—See p 194
HEWES & PHILLIPS IRON WORKS, 8 Orange c Ogden—See p 191
HEWITT BEARING METAL CO., 209 Berkeley av—See p 194
HEWITT JOHN FOUNDRY CO., 18-30 Sherman av, East Newark—See p 196
JENKINS MFG CO., 35 Farrand, Bloomfield—See p 194
NEW JERSEY RUBBER AND METAL CO., 157 S Canal c Abel—See p 264
Redlinghouse Jacob 74 Garden
Schueler T & Co 689 and 691 S 16th
SHAW BROS., 43 Hermon—See p 193
STEFFENS-AMBERG CO. THE, 260 Morris av
X-L BRASS FOUNDRY, 28 Garibaldi av—See p 194
ZUSI EDWARD, estate of, 80 Mechanic
Zusi Edward A 101 Monroe

Brass Founders' Supplies.

Brass Founders' Supply Co Hamburg pl n Av L
NEW JERSEY RUBBER AND METAL CO., S Canal c Abel—See p 264

Brass Rod Mfrs.

Continuous Casting Corporation (1101) 790 Broad

*Brass Turning.

WEBB MFG. CO., foot Centre—See p 227

Brass and Metal Goods Mfrs.

American Aluminum Ware Co (specialties) 374 Jelliff av
AMERICAN ART METAL CO., 46-52 Lawrence—See opp p 1559
AMERICAN BUTTON CO., 70 Morris av—See p 183
ART METAL WORKS THE, 9 Mulberry—See p 230
BRABSON BROS., 47 Hamilton—See p 197
COLONIAL STAMPING WORKS THE inc., (bedstead trimmings and novelties), 54 Lawrence—See p 22
Comte F & Co 146 Lafayette
CONLAN B. & CO., 87 Hamilton—See p 232
Fischer Bros & Corwin (novelties) 625-643 N 3d
GOERTZ AUGUST & CO. inc., 276 and 284 Morris av—See p 233
Gould's M Son & Co 115-117-119 Lafayette
HAVELL MFG. CO., 284 Washington—See p 232
HEDGES & BRO. inc., 10 Railroad pl—See p 194
Huebel Mfg Co 103 Monroe
INDUSTRIAL WIRE AND METAL WORKS (guards and railings), 95 High—See p 246
JENKINS MFG CO., 35 Farrand, Bloomfield—See p 194
Jenkinson R C & Co 289 Washington
Jost's Edmund Sons 48 Dickerson
Liebmann Rudolph Mfg Co 73 Bruen
M. A. B. METAL CO., Charles A. Bueck prop., 48 Mechanic—See p 234
Meisselbach A F & Bro works 26 Prospect, office 29 Congress
MERGOTT J. E. CO. THE, 320 Jelliff av—See p 234
National Metal Stamping & Mfg Co 494 Mulberry
NEW JERSEY SHEET METAL WORKS, Louis Kiefner prop., 36 High—See p 307
NEWARK BRASS WORKS, 22 Lawrence—See p 233
NEWARK PURSE FRAME MFG. CO., 552 S 11th—See p 234
NEWARK WIRE CLOTH CO. inc., 228 Verona av—See p 246
O'Neill & O'Neill, 82 Union
Phoenix Mfg Co 21 Baldwin
PLUMB DAVID S., 77 Norfolk—See p 229
Preston & Steele (novelties) 124 Green
Richmond Bros Co 177 Chestnut
Riker Co The 480 Washington
RILEY-KLOTZ MFG. CO., 19 Mulberry—See p 230
Ronson Specialty Co The 9 Mulberry
Rosenband Mfg Co inc (fancy) 22 Green
Schueler T & Co 689 and 691 S 16th
Standard Metal Mfg Co 237 Chestnut

STORSBERG F. CO., 20 Atlantic—See p 106
Walker D Mfg Co (stair rods) 274 Market
Western & Ahr 475 Washington
Zusi Edward A 101 Monroe

Brass and Wire Railings.

(See Iron Fence and Railing Mfrs.)

EAGLE WIRE & BRASS WORKS, 14 Warren pl—See p 246
INDUSTRIAL WIRE AND METAL WORKS, 95 High—See p 246
New Jersey Wire and Brass Works 372 Market
NEWARK WIRE CLOTH CO. inc., 228 Verona av—See p 246
STORSBERG F. CO., 20 Atlantic—See p 106

Brassieres.

Pansey Brassiere 73 Clinton
W B Brassiere Co 146 Summit

Brewers.

Anheuser-Busch Newark Agency 351 Park av and N 11th
BALLANTINE P. & SONS (beer, ale and porter), 58 Freeman—See p 56
Birkenhauer Brewing Co 258 Morris av
DuBOIS BREWING CO., 310 Jelliff av—See p 60
EAGLE BREWING CO. THE, 20 Hayes—See p 61
ESSEX COUNTY BREWING CO., 85 Clifton av—See p 58
FEIGENSPAN CHRISTIAN (a corporation), 50 Freeman—See p 60
Freibott M J (birch beer) 30 17th av
HAUCK PETER & CO., 500-518 Harrison av, Harrison, N J—See p 58
HENSLER JOSEPH BREWING CO. THE (lager beer brewery) (lager and ale), 73 Hamburg pl and 192-204 Murray—See p 59
HOME BREWING CO. THE, 13 Hudson
KRUEGER GOTTFRIED BREWING CO., 75 Belmont av—See p 57
LYON & SONS' BREWING CO., 97 S Canal—See p 61
PABST MILWAUKEE BEER DEPOT, 7 to 15 E Fairmount av—See p 55
REIN BRAU BREWERY, 50 Commercial—See inside front cover
Schalk Brewery inc 13 Lewis
TREFZ C. BREWERY, 28 Beacon—See p 57
Union Brewing Co of Newark 333 Springfield av
Wahlers Dietrich estate of (birch beer) 232 Peshine av
WIEDENMAYER GEORGE W. inc., 596 Market—See p 60

Brewers' Supplies.

AMERICAN OIL AND SUPPLY CO., 52 Lafayette—See p 256
Consolidated Mfg Co (ale and beer pump valves) 56 Belmont av
JENKINS MFG. CO., 35 Farrand, Bloomfield—See p 194
LAWRENCE L. & CO. (coppersmiths), 292 Halsey—See p 91
NEWARK BRASS WORKS (brass work) 22 Lawrence—See p 233
SOMMER JOHN FAUCET CO., Central av c Morris av—See p 247

Brick Dealers.

COOK & GENUNG COMPANY, 16 Jersey 132 Lillie and 460 Ogden
GULICK WALTER D., 390 Elizabeth av—See p 85
REID A. S. & CO., (1501) 784 Broad—See p 70
TOMKINS BROS., (common and face brick) 48-94 Passaic—See p 68
UPTON FRANCIS R., (808) 11 Clinton—See p 70

Brick Mfrs.

Claycraft Mining & Brick Co (32) 45 Clinton
HARPER DAVID, office (208) Washington bdg 222 Washington and Harrison and Passaic av Harrison—See p 70
Metropolitan Paving Brick Co (919) 31 Clinton
Oschwald Joseph (25) 845 Broad
Sayre & Fisher Co foot Centre
Schaeffer Richard E (57) 45 Clinton

NEWARK DIRECTORY

1917

CONTAINING

A General Directory of the Citizens,
Classified Business Directory, Street Directory, New Map, a
Record of the City Government, its institutions, also
a Chronological History of the City.

VOL. LXXXII.

PRICE $6.00

THE PRICE & LEE COMPANY, Publishers
224 MARKET STREET

Booksellers and Stationers—continued
Sutta Albert 294 Plane
Sutta Boris 47 Academy
TOMPKINS & CHRISTIAN, 28 Clinton—See p 290
United Publishing and Supply Co (subscription agents) (406) 185 Market
Winans George E 550 Orange

Boot Black Supplies and Stands.

VOGELER O. T. & SON, 253 Market—See p 148

Boot Blacking Establishments.

Aulisi & Prestifilippo 168 Bloomfield av
Bisciotti Patsy 35 16th av
Calimano Antonio 800 Broad
Caloudis Vasil 239 Springfield av
Calpacos George 572 Orange
Caputo Anthony 763 Broad
Caputo Giuseppe 51½ Ferry
Caras Bros 306 Market
Carlucci Antonio 472 Broad
Chapin Benjamin E, D L & W R R Station Broad and Plane
Choublus James 17 Springfield av
Corbo Rocco 656 Bergen
Custode Daniel 492 Broad
Demont Bros 264 Market
Dondiego Michele 435 Springfield av
Gaertig Albert 216 Clinton av
Garas Sharos 29 Springfield av
Geocas & Chlobekos 446 Orange
Gianaras Nicholas 201 Market
Gregorio Michele 278½ 15th av
Grieco Rinaldo 678 Mt Prospect av
Hamilton Fred 273A W Kinney
Jeff Ralph 397½ Broad
Kaplan Louis 31 16th av
Karras Bros 62 Market
Lattrillo Frank 428 Washington av
Lombardo Angelo A 275 Springfield av
Longo Antonio 349 15th av
Metsky Herman 57 Market
Montir Nicholas 5 Beaver
Nigro Ben 290½ 15th av
Papa Donato 52 Orange
Papademetrew Athanasios 358 Broad
Plates & Karas 316 Market
Rogers Michael 8 Bloomfield av
Rosinas Peter 124½ Springfield av
Russo Gennaro City Hall
Scordar Harry 468 18th av
Sisto William 64 Bank
Strates William 140½ Market
Tomaras James 108½ Market
Valio Antonio 173 Belmont av
Zevas & Argyrios 172 Market

Boot and Shoe Dealers.

(See Shoe Dealers.)

Boot and Shoe Makers and Repairers.

(See Shoe Makers and Repairers.)

Boot and Shoe Mfrs.

(See Shoe Mfrs.)

Bottle Dealers.

American Bottle Co 501 Bergen
Berk Osias 238 and 240 Belmont av
Delisa Michael 42 Adams
Froehlich Aaron 169 Newark
HOERNLEIN B. & SON (wholesale and retail), 174 Boyd—See p 252
Hornlein Edward E 115 Devine
Kestenbaum S 188 Livingston
Lanza Michael 87 Delancey
Leshins Morris 39 Charlton
Saldutti Felix Sons 17 Madison
Saldutti P & Son 90 Jackson
Schubert August 193 Livingston

Bottle Stopper Mfrs.

Imperial Stopper Co 48 Spring

Bottlers.

Abendschoen William r 45 S 6th
BALLANTINE P. & SONS, 437 Ferry, office 58 Freeman—See p 54
Beron Martin (lager) 459 Ferry
Birkenhauer Brewing Co 258 Morris av
BRASSER JOHN B. (beer), 7-15 E. Fairmount av—See p 52
Braunschweig H Albert Mrs (beer) 581 S 19th
Coca Cola Bottling Co of Newark 171 Ogden
CONSOLIDATED BOTTLING CO. OF NEWARK, N. J (ale, beer and porter), 329-333 Orange—See p 53
Corish Patrick H (mineral water) 63 Lexington
Crown Bottling Co (soda) 22 Monmouth
Crystal Bottling Works r 217 Broome
DuBOIS BREWING CO., 310 Jelliff av—See p 58
EAGLE BREWING CO. THE, 20 Hayes—See p 59
ESSEX COUNTY BREWING CO., 63 Clifton av—See p 56
Farber Bros 500 S 12th
FEIGENSPAN CHRISTIAN (a corporation), 50 Freeman—See p 58
GASH & LAFKOWITZ, 79 Monmouth—See p 51
Goepferich Adolph C 67 Wall
Goerz Gustave 439 S 12th
Golden Star Bottling Co 91 Warwick
Gottwalt Stephen A 39-41 S 8th
HAUCK PETER & CO., 500-518 Harrison av, Harrison, N. J.—See p 56
HENSLER JOSEPH BREWING CO. THE (ale and bottling dept.), (lager and ale) 192-204 Murray—See p 57
Hoffman F & Sons (soda water) 407 Grove V
Horton Soda Water Co (soda water) 43 New York av
Jacobson & Hodes (mineral water) r 49 Livingston
KRUEGER GOTTFRIED BREWING CO. (bottling dept.), 59 and 75 Belmont av—See p 55
LYON & SONS BREWING CO. (bottling dept.) 109 Commerce—See p 59
Malto Brau Co (Malto Brau) 72 Tichenor
MARGOW LUDWIG, 415 Morris av—See p 52
Moehring John 411 Central av
MUNZ RUDOLPH (beer), 30 Beacon—See p 53
MURRAY F. & H. A., INC., 186 Market—See p 150
Newark Bottling Works (oil and vinegar) 212 Charlton
PABST MILWAUKEE BEER DEPOT (beer), 7-15 E Fairmount av—See p 52
PANNICK & KIEFER (beer), 20 Hayes—See p 52
Park View "Old Fashioned" Bottling Works 440 Elizabeth av
Reinhardt William (beer) 61 3d
Saalmuller John (beer) 601 S 11th
Schmidt Jacob Jr 79 Grafton av
Strause Edward 17 William
Universal Ice and Distributing Co (beer) Peddie c Ridgewood av
Wachter George (vinegar) 91 Garrison
WIEDENMAYER GEORGE W., inc., 596-604 Market—See p 58
Wigder B Inc 291 Norfolk
Younghaus Ernest R (beer) 566 S 15th

Bottlers' Exchange.

United Bottlers' Association of New Jersey 77 Monmouth

Bottlers' Machinery Mfrs.

Gilchrist Co The (corking) 236 Bank

Bottlers' Supplies.

Biertuempfel Bros Cork Co (corks) 37-41 Av L
Carroll Joseph A 382 Sussex av
Dane Mfg Co (Porcelain Siphon Heads) 333 6th av
Haussling & Bader 13 Springfield av
Liquid Carbonic Co Ferry c Freeman
Newark Cork Products Inc 245-247 N J R R av
POMEROY I. CO. (wax), 264 Halsey—See p 185
Rommel & Schell Supply Co 163 Mulberry
Standard Bottlers' Supply Co 203 Mulberry

Bowling Alley Builders.

BRUNSWICK-BALKE-COLLENDER CO. OF N. J. THE, 257 Market—See p 49

Bowling Alley Fixtures.

JAEHNIG GAS FIXTURE CO. (lighting apparatus), 221 13th av—See p 149

Bowling Alleys.

Beck George A 201 Clinton av
Birkenhauer John H 202 S Orange av
Domenick Angelo 417 Bloomfield av
Eaton Jay 64 Park pl and 32 Branford pl
Eichenlaub Frank X 474 Avon av
Fruitman Sully 102 Magazine
Gannon Joseph L 311 Bank
Huttenbach F William 262 Washington
Kemper Theodore 328 S 14th
Knoepfer Charles 323 Runyon
LeGlise George W 197 Thomas
Lehner Kalman 63 16th av
Lieber Charles A 114 Hamburg pl

Metz Charles 425 Springfield av
Schwalbe Louis 54 Branford pl
Semon Edward 995 S Orange av V
Shaw Louis 227 Ferry
Silver Emanuel 32 17th av
Smith Max 122 Hawthorne av
Smith Thomas D 382 6th av
Wagner Fred 95 Lang
Wass Oscar 11 16th av
Webber John 264 Belmont av
Weingarth & Whatton 839 Broad
Werner Herman 361 S 9th
Woelfle William F 572 Central av
Woodhouse James 257 Washington av

Bowling Ball Mfr.

Kobaut John C 117 Green

***Bowling Supplies.**

KOHAUT JOHN C. (ball pins, etc), 117 Green

Box Mfrs.

(See Packing Boxes, also Paper Boxes.)

MENGEL BOX COMPANY, foot of Broadway at Hackensack River, Jersey City, N. J.—See p 155

***Box Shooks.**

DODGE & BLISS CO., West Side av c Van Keuren av, Jersey City—See p 155
HILL & MOUNT (wholesale), (222) 31 Clinton—See p 155
MENGEL BOX COMPANY, foot of Broadway at Hackensack River Jersey City N J—See p 155
RIVERSIDE BOX AND LUMBER CO., 1 Riverside av—See p 159

***Brass Checks.**

UNIVERSAL STAMP WORKS, 252 Market—See p 285

Brass Finishers.

HEDGES & BRO. inc., 10 Railroad pl—See p 178
JENKINS MFG. CO., 35 Farrand, Bloomfield—See p 181
NEWARK BRASS WORKS, 22 Lawrence—See p 219
O'Brien & Newton 48 Mechanic
Steffen Amberg Co The 260 Morris av
Wheaton A W Brass Works 110 Walnut
Zusi Edward A 101 Monroe

Brass Founders.

BIRTWISTLE EDWARD S., 148 N J R R av
Brabson Bros 47 Hamilton
Bushauer P estate of 261 Elm
Defroville Julius 142 McWhorter
Forbes Duncan 90 Seymour av
Goldsmith C A 42 Cutler
Griffoul A and Bros Co 280 Chestnut
Hanus & Marcus 64 Elm
HEDGES & BRO. inc., 10 Railroad pl—See p 178
HEWES & PHILLIPS IRON WORKS, 8 Orange c Ogden—See p 178
HEWITT BEARING METAL CO., 209 Berkeley av—See p 181
HEWITT JOHN FOUNDRY CO., 17-20 Sherman av, East Newark—See p 182
JENKINS MFG CO., 35 Farrand, Bloomfield—See p 181
REDLINGHOUSE JACOB, 74 Garden—See p 181
Schueler T & Co 689 and 691 S 16th
SHAW BROS., 43 Hermon—See p 180
Steffens-Amberg Co The 260 Morris av
ZUSI EDWARD, estate of, 80 Mechanic
Zusi Edward A 101 Monroe

Brass Founders' Supplies.

Brass Founders' Supply Co Hamburg pl n A V L
SAN GIACOMO & SONS, 8 Canal c Abo—See p 252

***Brass Turning.**

WEBB MFG. CO., foot Centre—See p 213

Brass and Metal Goods Mfrs.

American Aluminum Ware Co (specialties) 374 Jelliff av
AMERICAN ART METAL CO., 46-52 Lawrence—See opp business directory.
AMERICAN BUTTON CO., 70 Morris av—See p 171
ART METAL WORKS THE, 7-15 Mulberry—See p 216
Brabson Bros 47 Hamilton
Colonial Stamping Works The Inc (bedstead trimmings and novelties) 54 Lawrence
Comte F & Co 146 Lafayette
CONLAN B. & CO., 87 Hamilton—See p 218
Fischer Bros & Corwin (novelties) 625-643 N 3d
GOERTZ AUGUST & CO. inc., 276 and 284 Morris av—See p 219
Goulds M Son & Co 115-117-119 Lafayette
HAVELL MFG. CO., 284 Washington—See p 218
HEDGES & BRO. inc., 10 Railroad pl—See p 178
Huebel Mfg Co 103 Monroe
INDUSTRIAL WIRE AND METAL WORKS (guards and railings), 95 High—See p 232
JENKINS MFG CO., 35 Farrand, Bloomfield—See p 181
Jenkinson R C & Co 289 Washington
Jost's Edmund Sons 48 Dickerson
Liebmann Rudolph Mfg Co 73 Bruen
Meisselbach A F & Bro works 26 Prospect, office 29 Congress
MERGOTT J. E. CO. THE, 320 Jelliff av—See p 220
National Metal Stamping & Mfg Co 494 Mulberry
New Jersey Sheet Metal Works Louis Kiefner prop 36 High
NEWARK BRASS WORKS, 22 Lawrence—See p 219
NEWARK PURSE FRAME MFG. CO., 552 S 11th—See p 220
NEWARK WIRE CLOTH CO. inc., 228 Verona av—See p 232
O'NEILL & O'NEILL, 82 Union—See p 221
PLUMB DAVID S., 77 Norfolk—See p 215
Richmond Bros Co 177 Chestnut
Riker Co The 480 Washington
RILEY-KLOTZ MFG. CO., 19 Mulberry—See p 216
Rosenband Mfg Co inc (fancy) 22 Green
Schueler T & Co 689 and 691 S 16th
Standard Metal Mfg Co 237 Chestnut
STORSBERG F. CO., 20 Atlantic—See p 149
Walker D Mfg Co (stair rods) 274 Market
Zusi Edward A 101 Monroe

Brass and Wire Railings.

(See Iron Fence and Railing Mfrs.)

EAGLE WIRE & BRASS WORKS, 33 Essex pl—See p 232
INDUSTRIAL WIRE AND METAL WORKS, 95 High—See p 232
New Jersey Wire and Brass Works 372 Market
NEWARK WIRE CLOTH CO. inc., 228 Verona av—See p 232
STORSBERG F. CO., 20 Atlantic—See p 149

Brassieres.

Pansey Brassiere 73 Clinton
Vogue Manufacturing Co 56 Clinton
W B Brassiere Co 146 Summit

Brewers.

Anheuser-Busch Newark Agency 351 Park av and N 11th
BALLANTINE P. & SONS (beer, ale and porter), 58 Freeman—See p 54
Birkenhauer Brewing Co 258 Morris av
DuBOIS BREWING CO., 310 Jelliff av—See p 58
EAGLE BREWING CO. THE, 20 Hayes—See p 59
ESSEX COUNTY BREWING CO., 85 Clifton av—See p 56
FEIGENSPAN CHRISTIAN (a corporation), 50 Freeman—See p 58
HAUCK PETER & CO., 500-518 Harrison av, Harrison, N J—See p 56
HENSLER JOSEPH BREWING CO. THE (lager beer brewery) 73 Hamburg pl and 192-204 Murray—See p 57

Brewers—continued

HOME BREWING CO. THE, 13 Hudson
KRUEGER GOTTFRIED BREWING CO., 75 Belmont av—See p 55
LYON & SONS' BREWING CO., 97 S Canal—See p 59
PABST MILWAUKEE BEER DEPOT, 7 to 15 E Fairmount av—See p 52
REINBRAU BREWERY, 50 Commercial—See inside front cover
SCHALK BREWERY, INC., 3-27 Lewis—See p 59
Sobel Philip (birch beer) 30 17th av
TREFZ C. BREWERY, 28 Beacon—See p 55
Union Brewing Co of Newark 333 Springfield av
Wahlers Dietrich estate of (birch beer) 232 Pershine av
WIEDENMAYER GEORGE W. Inc., 596 Market—See p 58

Brewers' Supplies.

ALUMINUM GOODS MFG. CO., 699 Springfield av c S 19th—See p 218
AMERICAN OIL AND SUPPLY CO., 52 Lafayette—See p 244
Consolidated Mfg Co (ale and beer pump valves) 6 Belmont av
Lawrence L & Co (coppersmiths) 292 Halsey
NEWARK BRASS WORKS (brass work) 22 Lawrence—See p 219
Rauh Robert (machinery) 310 Elizabeth av
Rommel & Schell Supply Co 163 Mulberry
SOMMER JOHN FAUCET CO., Central av c Morris av—See p 233

Brick Dealers.

AVERY & MAGEE, (218) 738 Broad—See p 70
COOK & GENUNG COMPANY, 16 Jersey 32 Lillie and 460 Ogden—See p 70
GULICK WALTER D., 390 Elizabeth av—See p 82
REID A. S. & CO., (1501) 784 Broad—See p 69
TOMKINS BROTHERS (common and face brick), 48-94 Passaic—See p 67
UPTON FRANCIS R., (808) 11 Clinton—See p 69

Brick Mfrs.

AVERY & MAGEE, (218) 738 Broad—See p 70
Claycraft Mining & Brick Co (32) 45 Clinton
CRAIGAN BRICK CO., (218) 738 Broad—See p 70
Metropolitan Paving Brick Co (419) 31 Clinton
Oschwald Joseph (25) 845 Broad
Sayre & Fisher Co foot Centre
Schaeffer Richard E (57) 45 Clinton

Bridge Builders.

AVERILL-MATTHEWS CO., (919) 31 Clinton—See p 105
HAY FOUNDRY AND IRON WORKS, 93 Plum Point lane—See p 189
LAWRENCE G. W. CO., (316) 20-26 Clinton—See p 106
LINDE & GRIFFITH CO., ft 4th av—See p 84
Mutchler S E & Co (1006) 784 Broad
O'GARA CONSTRUCTION CO., (45) 244 Market—See p 84

Brokers.

Allen Harry (real estate) (311) 790 Broad
Avery Joseph W (investment) (210) 207 Market
Beneficial Loan Society (loan) (1118) 31 Clinton
Beneficial Loan Society of Essex County (loan) (301) 142 Market
BENESCH A. B. & CO. (investment), (822) 790 Broad—See p 32
BERRY JAMES A. (loan), 28 Clinton—See p 273
Bird Harry S (merchandise) (305) 800 Broad
Birkenhauer John (1021) 790 Broad
BLASBERG & ZIEGLER, (603) 40 Clinton—See 275
BOND E. E. & CO. (loan), 764 Broad—See p 272 and top lines
BOWERS PHILIP J. & CO. (real estate), (2) 189 Market—See p 274
Broad Fifty Association (real estate) (32) 845 Broad
Brown R Donaldson (205) 828 Broad
BRYCE P. LYNDON (loan) (701) 810 Broad—See p 280
Butler F W & Co (bond) 69 Bergen
Byrne & McDonnell (stock) 2d floor 776 Broad
CAIRNS SAMUEL R. (real estate), 494 Broad—See p 275
Cassidy William J (505) 790 Broad
CHADBURNE F. M. & CO. (investment), (1110) 784 Broad—See p 32
Chisholm & Chapman (stock) 777 Broad
Clark E H (investment) (502) 790 Broad
Credit Finance Co (loan) (1118) 31 Clinton
Dickenhorst Walter H D (stock) 9 Clinton
Dobbins Automobile Exchange Inc 390 Belleville av
Dobbins Frederick A (yacht) Riverside av n Chester av
Duffy Edward F (securities) 11 Clinton
Easterday W W & Co Inc (404) 810 Broad
Economic Business Service (merchandise) (408) 40 Clinton
EISELE & KING (stock), 752 Broad—See back cover
Essex Finance Co (loans) 345 Springfield av
GEISER & BLUM (real estate), (32) 845 Broad—See p 276
Germanus Emil 214 Ferry and 97 Mercer
Graham John A (stock) 224 Market
Griffith Charles G (patent) (48) 120 Market
Grossman Henry H (mortgage) (512) 31 Clinton
Harris Hyman (investment) 21 S Orange av
HARRISON GEORGE D. (mortgage bonds) 1009 Springfield av, Irvington—See p 279
Henry Bros & Co (stock) (309) 790 Broad
Hodson Clarence & Co (1118) 31 Clinton
Holding Co (investment securities) (808) 31 Clinton
Houston David (insurance) 784 Broad
Jersey Business Exchange (business) 197 Market
Kieran Charles J (insurance and real estate), (26) 16 Clinton
Leon Israel (business) (609) 197 Market
Moeller Ferd R (securities stocks and bonds) 582 Broad
MORSE MYRON W. (loan) 139 3d av and 740 Broad—See p 276
Mortgage & Loan Co (investment) (720-721) 763 Broad
Muir John & Co (stock) 810 Broad
National Business Exchange (business) (312) 20 Clinton
Neuwirth Harry S (real estate) (611) 31 Clinton
New Jersey Commercial Exchange (investment) (64) 70 Park pl
New Loan Co (loan) 201 Springfield av
Newark Provident Loan Association (loan) (326) 31 Clinton
North Jersey Investment Co (investment) 741 Broad
Norton Harry A (business) (412) 20 Clinton
Padula James V 222 Bruce
Parisi Matteo (money) 198 Bruce
Peoples Finance Co (loan) (401) 185 Market
POPIK ALFRED (loan and bond), American National Bank bdg, Springfield av c Belmont av—See p 280
POST & FLAGG (stock and investment), second floor (204) 790 Broad—See p 31
PRUDEN WALTER R. (real estate), 139 Main E Orange—See p 273
Rawson Robert D (insurance) (1003) 11 Clinton
Redden & Martin (customs) (409) 11 Clinton
Reliable Mortgage Investment Co (investment) (720-721) 763 Broad
RIPPEL J. S. & CO. (investment), 18 Clinton—See p 31
RUSSELL NATHAN, INC., 28 Broad, Bloomfield, N. J.—See p 272
Saltzman Nathan (investment) (1005) 11 Clinton
Savings Investment Co (investment) (906) 810 Broad
SCHLESINGER LOUIS, Inc. (loan), Essex Building 31 Clinton—See p 271
Schmidt F W & Co (grain) 222 Market
Sessions Loan & Trust Co (bonds) (423) 790 Broad
Spingarn Leopold (stock) (405) 207 Market
Stout Bros (produce) (408) 784 Broad

NEWARK

DIRECTORY

1918

CONTAINING

A General Directory of the Citizens

Classified Business Directory, Street Directory, New Map, a Record of the City Government, its Institutions, also a Chronological History of the City

VOL. LXXXIII.

PRICE $8.00

THE PRICE & LEE CO., Publishers

224 MARKET STREET

AMERICAN FOUNDRY CO 634 S 11th—See p 175
BIRTWISTLE EDWARD S 148-150 NJRR av
BLOOMFIELD FOUNDRY CO 38-46 Myrtle Bloomfield—See p 173
Brabson Bros 47 Hamilton
Bushauer P estate of 261 Elm
Defreville Julius 142 McWhorter
Enterprise Brass and Bronze Foundry Co 60 Elm
Forbes Duncan 90 Seymour av
FRANZ-HOLBROOK BRONZE CO 209 Berkeley av—See p 172
Goldsmith C A 42 Cutler
Hanus & Marcus 150 Elm
HEDGES & BRO Inc 10-14 Railroad pl—See p 174
HEWES & PHILLIPS IRON WORKS 8 Orange c Ogden—See p 168
HEWITT JOHN FOUNDRY CO 17-29 Sherman av East Newark—See p 173
REDLINGHOUSE JACOB 74 Garden—See p 174
SCHUELER T & CO 689 and 691 S 16th—See p 175
SHAW BROS 43 Hermon—See p 171
STEFFENS-AMBERG CO THE 260 Morris av
ZUSI EDWARD estate of 80 Mechanic
Zusi Edward A 101 Monroe

Brass Founders' Supplies

Brass Founders' Supply Co Hamburg pl n Av L
SAN GIACOMO & SONS S Canal c Abel—See p 253

Brass Turning

WEBB MFG CO foot Centre—See p 206

Brass Goods Mfrs

American Aluminum Ware Co (specialties) 374 Jelliff av
AMERICAN ART METAL CO 46-52 Lawrence —See opp p 1635
AMERICAN BUTTON CO 70 Morris av—See p 159
BLOOMFIELD FOUNDRY CO 38-40 Myrtle Bloomfield—See p 173
Brabson Bros 47 Hamilton
Colonial Stamping Works The Inc (bedstead trimmings and novelties) 54 Lawrence
Comte F & Co 146 Lafayette
CONLAN B & CO 87 Hamilton—See p 214
Fischer Bros & Corwin (novelties) 625-643 3d
FORCE & STEEL Inc (novelties) 93 Chestnut—See p 212
GOERTZ AUGUST & CO Inc 276 and 284 Morris av—See p 215
Gould's M Son & Co 115-117-119 Lafayette
HAVELL MFG CO 284 Washington—See p 214
HEDGES & BRO Inc 10-14 Railroad pl—See p 174
Huebel Mfg Co 103 Monroe
INDUSTRIAL WIRE AND METAL WORKS (guards and railings) 95 High—See p 232
Jenkinson R C & Co 289 Washington
Liebmann Rudolph Mfg Co 73 Bruen
Meisselbach A F Mfg Co 29 Congress
MERGOTT J E CO THE 320 Jelliff av—See p 216
National Metal Stamping & Mfg Co 494 Mulberry
New Jersey Sheet Metal Works 36 High
NEWARK BRASS WORKS 22 Lawrence—See p 215
NEWARK PURSE FRAME MFG CO 552 S 11th —See p 216
NEWARK WIRE CLOTH CO Inc 228 Verona av —See p 232
O'NEILL & O'NEILL 82 Union—See p 216
PLUMB DAVID S 77 Norfolk—See p 211
Richmond Bros Co 177 Chestnut
Riker Co The 480 Washington
RILEY-KLOTZ MFG CO 19 Mulberry—See p 212
Rosenband Mfg Co Inc (fancy) 22 Green
SCHUELER T & CO 689 and 691 S 16th—See p 175
STANDARD METAL MFG CO 237 Chestnut c Jefferson—See p 217
STORSBERG F CO 20 Atlantic—See p 138
Walker D Mfg Co (stair rods) 288 Market
WINKLER CHARLES (specialties) 178-182 Emmet—See p 177
Zusi Edward A 101 Monroe

Brass and Wire Railings

(See Iron Fence and Railing Mfrs)
EAGLE WIRE & BRASS WORKS 33 Essex—See p 232
INDUSTRIAL WIRE AND METAL WORKS 95 High—See p 232
New Jersey Wire and Brass Works 372 Market
STORSBERG F CO 20 Atlantic—See p 138

Brassieres

H & W Co The 69 Clinton
Pansy Brassiere 73 Clinton
Specialty Brassiere Co Inc 267 Mt Pleasant av
Vogue Manufacturing Co 53 Bank
W B Brassiere Co 146 Summit

Brewers

Anheuser-Busch Newark Agency 351 Park av and N 11th
BALLANTINE P & SONS (beer ale and porter) 58 Freeman—See p 58
DuBOIS BREWING CO 310 Jelliff av—See p 62
Eagle Brewing Co The 20 Hayes
ESSEX COUNTY BREWING CO 85 Clifton av —See p 60
FEIGENSPAN CHRISTIAN (a corporation) 50 Freeman—See p 62
HAUCK PETER & CO 500-518 Harrison av Harrison N J—See p 60
HENSLER JOSEPH BREWING CO THE (lager beer brewery) 73 Hamburg pl and 192-204 Murray—See p 61
Home Brewing Co The 13 Hudson
KRUEGER GOTTFRIED BREWING CO 75 Belmont av—See p 59
LYON & SONS' BREWING CO 97 S Canal—See p 63
PABST MILWAUKEE BEER DEPOT 785 S 14th —See p 57
Schalk Brewery Inc 3-27 Lewis
Sobel Philip (birch beer) 30 17th av
TREFZ C BREWERY 28 Beacon—See p 59
Union Brewing Co of Newark 333 Springfield av
Wahlers Dietrich estate of (birch beer) 232 Peshine av
WIEDENMAYER GEORGE W Inc 596 Market —See p 62

Brewers' Supplies

ALUMINUM GOODS MFG CO 699 Springfield av c S 19th—See p 214
AMERICAN OIL AND SUPPLY CO 52 Lafayette—See p 244
Consolidated Mfg Co (ale and beer pump valves) 56 Belmont av
Lawrence L & Co (coppersmiths) 292 Halsey
NEWARK BRASS WORKS (brass work) 22 Lawrence—See p 215
Rommel & Schell Supply Co 150 Mulberry
SOMMER JOHN FAUCET CO Central av c Morris av—See p 233

Brick Dealers

COOK & GENUNG COMPANY 16 Jersey 132 Lillie and 460 Ogden—See p 70
REID A S & CO (1501) 784 Broad—See p 70
TOMKINS BROTHERS (common and face brick), 48-94 Passaic—See p 68
UPTON FRANCIS R (808) 11 Clinton—See p 70

Brick Mfrs

Claycraft Mining & Brick Co (32) 45 Clinton
Manhattan Brick Co (303) 164 Market
Oschwald Joseph (25) 845 Broad
Sayre & Fisher Co foot Centre
Schaeffer Richard E (55) 45 Clinton

Bridge Builders

Averill-Matthews Co (802) 31 Clinton
HAY FOUNDRY AND IRON WORKS 93 Plum Point lane—See p 182
LINDE & GRIFFITH CO ft 4th av—See p 85
Mutchler S B & Co (1006) 784 Broad
O'GARA CONSTRUCTION CO (45) 244 Market —See p 85

Bristle Mfr

Cedar Elzarus 5 Oliver

Brokers

Altemus Lumber Co (lumber) (204-205) 245 Springfield av
Avery Joseph W (investment) (210) 207 Market
Beneficial Loan Society (loan) (1118) 31 Clinton
Beneficial Loan Society of Essex County (loan) (301) 142 Market
BENESCH A B & CO (investment) (822) 790 Broad—See p 36
BERRY JAMES A (loan) 28 Clinton—See p 271

ATTACHMENT 31

SEMI-ANNUAL REPORT AS PER REQUIREMENTS C-2
REPORT NO. 6 - SEPTEMBER 30, 1977

Requirement A (1) - Narrative Summary

The Industrial Department continued the complicated task of categorizing the Major and Potential Major Contributing Industries. Plants known to conduct electroplating, leather tanning and textile operations were visited.

These industrial categories were selected because the wastes from these operations generally contain toxic chemicals and/or heavy metals. Prior to March 31, 1977, 112 plant visits were made. Between April 1 and September 30, 1977, 85 additional plant visits were made for a total of 197.

In May the department distributed Sewer Connection Applications to the 233 companies that had previously indicated the presence of Heavy Metals in their discharge. This information will aid in the Heavy Metal Source Determination Study required by USEPA and be used in conjunction with the pretreatment program. P.V.S.C. Inspectors made fifty two visits to plants and municipal officials in conjunction with this phase.

In addition, 93 plants were visited in order to conduct field surveys, assist plant personnel in completing the Waste Effluent Survey and/or to review questionable data previously submitted. Since 45 plant visits were made prior to April 1, 1977, the total number of plant visits through September 30, 1977 is 138. This is part of a comprehensive review of the list of companies initially designated as Non Major Contributing Industry in order to verify the designation. Finally, department personnel have been reviewing the list of companies to insure the designation previously made was correct. Based on additional data requested by PVSC, a total of nine companies have been redesignated.

INDUSTRIAL WASTE SURVEY

The following represents the status of the Industrial Waste Survey as of September 30, 1977:

A.	Major Contributing Industries (50,000 gpd or more).	178
B.	Potential Major Contributing Industries (Potential Toxic Waste under 50,000 gpd)	62
C.	Potential Major Contributing Industries (Heavy Metal Waste under 50,000 gpd)	87
D.	Potential Major Contributing Industries (Incompatible Waste under 50,000 gpd)	6

E. Non-Major Contributing Industries (with Industrial Wastes) 2171

F. Industries with Industrial Waste Deleted from List (Out of Business, Moved Out of District, etc.)

1) Prior to March 31, 1977 223
2) March 31, 1977 to September 30,1977 6

Total . . . . (Not included in grand total) 229

Establishments Contacted Reporting No Industrial Wastes 2230

Total 4734

G. Surveys Outstanding (New) 10

Estimated Additional New Surveys to be Made in 1977 15

Estimated Total Number of Industries (rounded off) 4800

Attached hereto are reports to replace those submitted on March 31, 1977:

Appendix A - Revised List of Major Contributing Industries

Appendix B-1 Revised List of Potential Major Contributing Industries due to a Toxic Waste

Appendix B-2 Revised List of Potential Major Contributing Industries due to a Heavy Metal Waste

Appendix B-3 Revised List of Potential Major Contributing Industries due to an Incompatible Waste

(The previously submitted Appendices should be discarded).

As of March 31, 1977, PVSC had submitted 317 Section IV Forms, which reported industrial waste contribution to the PVSC system. These must be updated and we are therefore submitting the following:

ENCLOSURE (1) - List of Section IV Forms on seven companies to be deleted from the original application (since they are no longer classified as Major or Potential Major Contributing Industries) together with the reason for the deletion.

ENCLOSURE (2) - List and new Section IV Forms on 23 Major and Potential Major Contributing Industries to be added to those previously reported.

ENCLOSURE (3) - List and new Section IV Forms on 3 Major and Potential Major Contributing Industries to replace those previously submitted.

APPENDIX A

REVISED SEPTEMBER 30, 1977

MAJOR CONTRIBUTING INDUSTRIES

APPENDIX A

REVISED SEPTEMBER 30, 1977

MAJOR CONTRIBUTING INDUSTRIES

SIC #	COMPANY & TOWN
	ELMWOOD PARK
2621	MARCAL PAPER MILLS, INC.
	EAST RUTHERFORD
2098	DELSACO FOOD CORPORATION
2819	ROYCE CHEMICAL COMPANY
	FAIR LAWN
7395	EASTMAN KODAK
7699	EKCO PRODUCTS, INC.
2869	FISHER SCIENTIFIC CO. - CHEMICAL DIVISION
2052	NABISCO, INC.
2261	RAINBOW DYE & FINISHING, INC.
2261	RENCO MFG.
2865	SANDOZ COLOR & CHEMICAL - DIV. OF SANDOZ WARNER
3534	SANDVIK STEEL, INC.
	GARFIELD
2621	GARDEN STATE PAPER CO., INC.
3429	PRESTO LOCK CO., INC.
7218	RENTEX CORPORATION
3079	STULL ENGRAVING CO.
2865	TENNECO CHEMICALS, INC.
	GLEN ROCK
7399	MICROFILMING CORP. OF AMERICA
	LODI
2259	FABIEN CORPORATION
2833	FINE ORGANICS, INC.
2833	NAPP CHEMICAL, INC.
	LYNDHURST
3471	IMPERIAL ELECTRO PLATING CO.
2833	PENICK, S.B. & CO. - UNIT OF C.P.C. INTERNATIONAL
	SADDLE BROOK
3471	ARROW FASTENERS CORPORATION
3471	RANNO ELECTRO PLATING CO.
	WALLINGTON
2026	FARMLAND DAIRIES
	WOODRIDGE
3724	CURTIS-WRIGHT CORPORATION

APPENDIX A-2

SIC #	COMPANY & TOWN
	BELLEVILLE
3481	ETAMCO INDUSTRIES
3692	MC-GRAW EDISON CORPORATION
3471	MILLER & SONS
2099	RED STAR YEAST PLANT - DIV. UNIVERSAL FOODS
7213	THE GREAT ATLANTIC & PACIFIC TEA CO., INC.
2844	VAN DYK & CO., INC.
3559	WALLACE & TIERNAN - DIV. OF PENNWALT CORP.
3444	WALTER KIDDE & CO., INC.
	BLOOMFIELD
2621	MARCAL PAPER MILLS, INC.
2834	SCHERING CORPORATION
3641	WESTINGHOUSE ELECTRIC CORPORATION
	EAST ORANGE
3561	WORTHINGTON PUMP CORPORATION, U.S.A.
	NEWARK
2899	ADCO CHEMICAL COMPANY
2399	A & L DYERS, INC.
2816	ALLIANCE CHEMICAL, INC.
2821	ALPHA CHEMICAL & PLASTICS CORPORATION
2051	AMERICAN BAKERIES COMPANY
4013	AMTRAK RAILROAD STATION
2099	ANHEUSER BUSCH CORPORATION
2820	ASHLAND CHEMICAL COMPANY
4222	ATLANTIC REFRIGERATION COMPANY
3471	AUTOMATIC PLATING METHODS
3412	BAYONNE BARREL & DRUM COMPANY
2581	BENJAMIN MOORE & COMPANY
2011	BEST PROVISIONS CO., INC.
3641	CANRAD - HANOVIA PRECISION, INC.
2869	CELANESE CHEMICALS
2894	CHEM FLEUR, INC.
2086	COCA COLA BOTTLING CO. OF N.Y., INC.
2869	COLLOIDS, INC.
7213	CONSOLIDATED LAUNDRIES (HIGH ST.)
7213	CONSOLIDATED LAUNDRIES
2865	DU PONT DE NEMOURS & CO., INC.
2899	ELAN CHEMICAL COMPANY
3339	ENGELHARD INDUSTRIES DIVISION
3069	FABER-CASTELL CORPORATION
2865	FAIRMOUNT CHEMICALS COMPANY
3612	FEDERAL PACIFIC ELECTRIC COMPANY
2833	FINE PIGMENTS
2819	GENERAL COLOR COMPANY
2899	GROSS & COMPANY
2818	HONIG CHEMICAL & PROCESSING CORPORATION
2011	INSEL & INSEL

APPENDIX A-3

SIC #	COMPANY & TOWN
	NEWARK
5085	KINGSLAND DRUM & BARREL COMPANY
2011	LINDEN PACKING COMPANY
7218	MECHANICS UNIFORM COMPANY
2821	MINNESOTA MINING & MFG. CORPORATION
2032	MOTHERS - VITA FOODS
2631	NEWARK BOX BOARD COMPANY
2711	NEWARK MORNING LEDGER
3111	NEW JERSEY TANNING
3111	OCEAN LEATHER COMPANY
2865	ORBIS PRODUCTS CORPORATION
2865	OTTO B. MAY, INC.
2082	PABST BREWING COMPANY
2833	PENICK, S.B. CO. - DIV. C.P.C. INTERNATIONAL
2865	PITT CONSOL CHEMICAL COMPANY
3111	REMIS INDUSTRIES
3356	RONSON METAL CORPORATION
3111	SETON LEATHER COMPANY
2851	SHERWIN WILLIAMS COMPANY
3423	STANLEY TOOL COMPANY
2865	SUN CHEMICAL CORPORATION
2865	THOMASETT COLORS - DIV. OF STERLING DRUGS
3641	WESTINGHOUSE ELECTRIC CORPORATION
3679	WESTON INSTRUMENT DIVISION
3357	WILBUR DRIVER CORPORATION
2421	WISS & SONS
2821	X-CEL CORPORATION
	NUTLEY
2869	ATLANTIC CHEMICAL CORPORATION
2833	HOFFMAN LA-ROCHE, INC.
3670	INTERNATIONAL TELEPHONE & TELEGRAPH CORPORATION
2899	OXY-METALS IND. CORP. - SELREX
	ORANGE
2082	RHEINGOLD BREWERIES
	HARRISON
2833	DIAMOND SHAMROCK CHEMICAL COMPANY
3356	DRIVER HARRIS COMPANY
3524	OTIS ELEVATOR COMPANY
3561	WORTHINGTON PUMP CORPORATION - U.S.A.
	KEARNY
2087	COCA COLA USA
2899	DREW CHEMICAL COMPANY
2851	EGYPTIAN LACQUER MFG. COMPANY
2077	HARRISON BY-PRODUCTS CO.
2087	KOHNSTAMM & CO., INC.
2077	THEOBALD INDUSTRIES

APPENDIX A-4

SIC #	COMPANY & TOWN
	CLIFTON
3692	BRIGHT STAR INDUSTRIES
3679	DUMONT ELECTRON TUBES & DEVICES CORPORATION
2899	FRITZCHE DODGE & OLCOTT, INC.
2869	GIVAUDAN CORPORATION
2033	GLOBE PRODUCTS COMPANY, INC.
2258	INTERNATIONAL VEILING
3679	MICROTRONICS CORPORATION
2869	MILES LABORATORIES, INC. - MARSHALL DIV.
2261	MISS BRENNER PRINTS
2833	NAPP CHEMICAL COMPANY
3316	NATIONAL STANDARDS COMPANY
2261	POUGHKEEPSIE FINISHING CORPORATION
2869	SCHER BROTHERS, INC.
3629	SEALTRONICS
2844	SHULTON, INC.
2645	STANDARD PACKAGING CORPORATION
2645	WHIPPANY PAPER BOARD
2099	YEAST PRODUCTS, INC.
	HALEDON
2865	HARMON COLORS CORPORATION
2261	AVALON DYEING & FINISHING CORPORATION
2281	EMPIRE DYEING COMPANY
2899	JERSEY STATE CHEMICAL COMPANY
	HAWTHORNE
2865	INMONT CORPORATION
2819	MERCK & CO., INC. METASOL DIVISION
3496	WHITE METAL MFG. CORPORATION
	PASSAIC
8411	CONTINENTAL CAN COMPANY
3490	DURALITE CO., INC.
3429	INDUSTRIAL HARDWARE - DIV. E.R. WAGNER CO.
2261	INTERSTATE DYEING COMPANY
3357	THE OKONITE COMPANY
2821	PANTASOTE COMPANY OF N.Y., INC.
2841	PRESCOTT, J.L. COMPANY
3093	STAUFFER CHEMICAL COMPANY
2262	SUNBRITE DYEING COMPANY
	PATERSON
2261	ALLIED TEXTILE PRINTERS CORPORATION
2865	AMERICAN COLOR & CHEMICAL COMPANY
2261	APOLLO DYEING & FINISHING CORPORATION
2269	BERGEN DYERS, INC.
2754	BERLES CARTON COMPANY
2024	BORDEN DAIRY & SERVICES DIVISION
2269	BORIS KROLL DYEING COMPANY
2231	BREWSTER FINISHING COMPANY, INC.
2086	COCA COLA BOTTLING CO. OF N.Y.
2261	COMO TEXTILE PRINTS, INC.
3411	CONTINENTAL CAN COMPANY